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THE JOURNAL OF APPLIED PSYCHOLOGY

JAMES P. PORTER, *Editor*
OHIO UNIVERSITY ATHENS, OHIO

With a Board of Cooperating Editors

SOME INTERESTING CONTRIBUTIONS IN THIS ISSUE:

E. G. WILLIAMSON AND J. G. DARLEY. Trends in the Occupational Choices of High School Seniors

ARDEN FRANDSEN. Mechanical Ability of Morons

J. W. M. ROTHNEY. The First Course in Psychology as a Guidance Project

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TRENDS IN THE OCCUPATIONAL CHOICES OF HIGH SCHOOL SENIORS

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AND

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VOCATIONAL counselors, from time to time, have commented on the irrational bases of the vocational choices made by students both in high school and in college. Impressions gained from work with individual students would lead one to believe that such factors as father's occupation, admiration for a successful adult relative, and the choice made by classmates and friends, play an important rôle in the making of these choices. Since many choices are irrational, it is difficult for students to determine the potency of such influences. Because of this inability to articulate and verbalize these casual factors, one must turn to an analysis of group data for a study of such a problem.

If the availability of vocational information is fairly constant from year to year, and if the distribution of vocational aptitudes is also similar from year to year in high school seniors in Minnesota, then fluctuations in the number of seniors choosing a particular occupation may be interpreted as indicating the influence of social opinions or fads regarding occupational opportunities. The classical example is the increase in choice of aviation following Lindbergh's flight. Probably this event so dramatized this work that many boys subsequently chose aviation.

While it is difficult to assign causes to trends in the vocational choices of high school seniors, yet the fact that certain trends are present should be useful to counselors in that such knowledge will make them more critical in their advising and,

in turn, will predispose them to insist that students think through the problem of choice in terms of aptitudes rather than fads or transient influences.

With this purpose in mind, an analysis of trends in occupational choices was made for each class of high school seniors in Minnesota for the years 1929 to 1933 inclusive. These data were collected in connection with the annual state-wide senior testing program of the Association of Minnesota Colleges, conducted for the purpose of providing a basis for advice regarding enrollment in college. As part of this program each senior was asked to state in his own words "The name of the occupation or profession you plan to follow as your life work." The trends revealed by the analysis of these choices for the first two years may be in error since the total number of seniors tested was approximately half of those graduating. In recent years, however, the sampling has increased to over ninety per cent. As was to be expected, a large number of these seniors reported "none" or "undecided" and others made no report. These blank reports were classified separately in computing the trends in vocational choices for this five-year period.

The vocational choices thus reported were classified according to the Brussell revision of the Barr-Taussig scale,[1] which includes six groupings, according to the hierarchy of occupational intelligence. These six groups are characterized as follows:

Group	*Illustrative Occupations*
I. High professional and executive	Engineer, editor, inventor, lawyer, doctor
II. Lower professional and large business	Accountant, bank official, dentist
III. Technical, clerical, and supervisory	Stenographer, railroad clerk, building contractor, master mechanic
IV. Skilled tradesmen and low clerical	Small retail dealer, sales clerk, lithographer, mechanic
V. Semi-skilled workmen	Fireman, metal finisher, hospital attendant
VI. Unskilled labor	Day laborer, farm laborer

[1] E. S. Brussell. A Revision of the Barr-Taussig Scale of Occupational Intelligence, M.A. Thesis, University of Minnesota Library, 1930.

In addition to these six groups, those students listing no choice were grouped separately.

Table I lists this classification of choices, for men and women separately, for the five years under consideration. Important subgroups under each of the six main headings are included for study of specific trends.

Considering first the group giving no occupational choice, it is seen that of the 4,091 men and 4,636 women included in the state-wide testing program in 1929, 1,517 men and 1,704 women failed to specify their vocational choice in this year. Without doubt many of these students were considering some occupation but simply hesitated to give its name. Similar data for the other years are included in this table. The percentages of "no choice" for men for the five years separately were in the order of year, 37.1, 28.3, 32.4, 35.3, and 39.9. For women, the percentages were, 36.8, 20.7, 27.4, 32.2, and 35.8. Henmon and Holt[2] reported only 16.9 per cent of Wisconsin high school senior men and women indicating no vocational preference in 1929 as compared with 36.9 per cent in Minnesota in the same year, men and women combined. While the reasons for this difference are not clear, it is apparent that over one-third of high school seniors in Minnesota during the last five years graduated with apparently inadequate vocational orientation.

Because of the fact that the number of seniors included in the testing program increased each year during this period, it is impossible to analyze the trends in occupational choices shown in Table I, by means of the numbers appearing in each group. Such an analysis of trends is revealed in Table II, which shows the percentage of choice classified in each group and subgroup.

An inspection of Table II reveals some interesting facts regarding the choices of seniors and, indirectly, reflects the effect of vocational guidance programs in Minnesota high

[2] V. A. C. Henmon and F. O. Holt. A report of the Administration of Scholastic Aptitude Tests to 34,000 High School Seniors in Wisconsin in 1929 and 1930. Bulletin of the University of Wisconsin, Serial No. 1786. General Series No. 1570, 1931, June, p. 37.

TABLE I

Number of Minnesota High School Senior Men and Women Making Specified Occupational Choice for the Years 1929 to 1933 Inclusive

	MEN					WOMEN				
	1929	1930	1931	1932	1933	1929	1930	1931	1932	1933
I. High Professional and Executive Occupations	1091	1341	1714	1845	1795	70	117	149	129	107
Banker	4	20	22	15	16	.....	.....	.....	.....	.....
Diplomatic Service	1	2	3	5	7	1	1	1	2	1
Engineering	661	793	1093	1115	975	6	13	25	11	13
Law	158	190	216	266	315	9	24	21	24	15
Medicine	164	178	197	235	271	22	38	44	55	49
Science Research	103	158	183	209	211	32	41	58	37	29
II. Lower Professional and Large Business Occupations	839	978	1296	1486	1215	2064	2886	3752	3764	3606
Business (Exec.)	446	546	715	808	662	577	759	1075	1169	1010
Dentistry	44	44	51	71	53	.....	7	8	4	.....
Literary Work	120	120	125	157	67	77	133	137	153	77
Sciences (Requiring less training than I)	50	52	90	100	92	10	13	18	16	15
Social and Religious Work	27	51	67	102	89	30	45	56	39	51
Teaching	152	165	248	248	252	1370	1929	2458	2383	2453
III. Technical, Clerical, Supervisory Occupations	371	567	824	904	972	792	1372	1886	2081	2115
Aviation	118	158	240	233	284	.....	.....	.....	.....	.....
Commercial (Managerial)	29	71	110	121	122	2	7	6	8	8
Commercial (Routine)	32	66	87	81	103	264	617	946	910	998

TABLE I.—(*Continued*)

	MEN					WOMEN				
	1929	1930	1931	1932	1933	1929	1930	1931	1932	1933
Creative Art	96	128	147	218	216	267	320	384	502	497
Librarian	.....	.....	4	1	.....	69	78	100	105	111
Technical Services	16	34	56	55	54	55	122	202	287	200
Public Entertainment	11	17	19	25	17	33	66	69	66	56
Social Service (Routine)	1	1	8	2	4	1	48	69	88	122
Teaching (Requiring less training than II)	68	92	153	168	172	101	114	110	115	123
VI. Skilled Tradesmen and Low Grade Clerical Work	258	454	823	834	977	5	22	34	27	60
Agriculture and Forestry	184	249	492	478	619	3	.....	4	4	2
Prof. Athletics and Sports	5	1	6	10	9	.....	.....	.....	.....	.....
Retail Dealers	8	22	21	32	16	.....	.....	7	5	2
Routine Clerical	1	5	12	16	28	1	13	22	18	34
Skilled Workmen	60	177	292	298	305	1	9	1	.....	22
V. Semi-skilled Occupations	8	22	25	38	48	1	6	10	11	7
Domestic	.....	.....	.....	.....	7	1	6	10	11	7
Semi-skilled	8	22	25	38	41	.....	.....	.....	.....	.....
VI. Unskilled Labor	7	10	24	18	34	.....	.....	.....	.....	.....
Total Number Choices Given and Classified	2574	3372	4706	5125	5041	2932	4403	5831	6012	5895
No Choice Given	1517	1329	2257	2798	3344	1704	1148	2203	2854	3290
Grand Total	4091	4701	6963	7923	8385	4636	5551	8034	8866	9185

TABLE II

Percentage Distribution of Occupational choices of Minnesota High School Senior Men and Women for the Years 1929 to 1933 Inclusive Based Upon the Total Number of Choices Reported

	MEN					WOMEN				
	1929	1930	1931	1932	1933	1929	1930	1931	1932	1933
I. High Professional and Executive Occupations	42.4	39.8	36.4	36.0	35.6	2.4	2.7	2.6	2.2	1.8
Banker	.2	.6	.5	.3	.3	.0	.0	.0	.0	.0
Diplomatic Service	.0	.1	.1	.1	.1	.0	.0	.0	.0	.0
Engineering	25.7	23.5	23.2	21.8	19.4	.2	.3	.4	.2	.2
Law	6.1	5.6	4.6	5.2	6.2	.3	.6	.4	.4	.3
Medicine	6.4	5.3	4.1	4.6	5.4	.8	.9	.8	.9	.8
Science Research	4.0	4.7	3.9	4.0	4.2	1.1	.9	1.0	.7	.5
II. Lower Professional and Large Business Occupations	32.6	29.0	27.6	29.0	24.1	70.4	65.5	64.3	62.6	61.2
Business (Exec.)	17.3	16.2	15.2	15.7	13.1	19.7	17.2	18.4	19.4	17.1
Dentistry	1.7	1.3	1.1	1.4	1.1	.0	.2	.1	.1	.0
Literary Work	4.7	3.6	2.7	3.1	1.3	2.6	3.0	2.3	2.5	1.3
Sciences (Requiring less training than I)	2.0	1.5	1.9	2.0	1.8	.4	.3	.3	.3	.3
Social and Religious Work	1.0	1.5	1.4	2.0	1.8	1.0	1.0	1.0	.6	.9
Teaching	5.9	4.9	5.3	4.8	5.0	46.7	43.8	42.2	39.7	41.6
III. Technical, Clerical, Supervisory Occupations	14.4	16.8	17.5	17.6	19.3	27.0	31.2	32.3	34.6	35.9
Aviation	4.6	4.7	5.1	4.5	5.6	.0	.0	.0	.0	.0
Commercial (Managerial)	1.1	2.1	2.3	2.4	2.4	.1	.2	.1	.1	.1
Commercial(Routine)	1.3	2.0	1.8	1.6	2.1	9.0	14.0	16.2	15.1	16.9

TABLE II—(*Continued*)

	MEN					WOMEN				
	1929	1930	1931	1932	1933	1929	1930	1931	1932	1933
Creative Art	3.8	3.8	3.1	4.3	4.3	9.1	7.2	6.6	8.3	8.4
Librarian	.0	.0	.1	.0	.0	2.4	1.8	1.7	1.8	1.9
Technical Services	.6	1.0	1.2	1.1	1.1	1.9	2.8	3.4	4.8	3.4
Public Entertainment	.4	.5	.4	.5	.3	1.1	1.5	1.2	1.1	1.0
Social Service (Routine)	.0	.0	.2	.0	.1	.0	1.1	1.2	1.5	2.1
Teaching (Requiring less training than II)	2.6	2.7	3.3	3.2	3.4	3.5	2.6	1.9	1.9	2.1
IV. Skilled Tradesmen and Low Grade Clerical Work	10.0	13.5	17.5	16.3	19.4	.2	.5	.6	.4	1.0
Agriculture and Forestry	7.2	7.4	10.5	9.3	12.3	.1	.0	.1	.0	.0
Prof. Athletics and Sports	.2	.0	.1	.2	.2	.0	.0	.0	.0	.0
Retail Dealers	.3	.7	.4	.7	.3	.0	.0	.1	.1	.0
Routine Clerical	.0	.2	.3	.3	.6	.05	.3	.4	.3	.6
Skilled Workmen	2.3	5.2	6.2	5.8	6.0	.05	.2	.0	.0	.4
V. Semi-skilled Occupations	.3	.6	.5	.7	.9	.0	.1	.2	.2	.1
Domestic	.0	.0	.0	.0	.1	.0	.1	.2	.2	.1
Semi-skilled	.3	.6	.5	.7	.8	.0	.0	.0	.0	.0
VI. Unskilled Labor	.3	.3	.5	.4	.7	.0	.0	.0	.0	.0
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

schools, in so far as such programs may influence trends in choices.

Among the men, high professional and executive occupations are chosen by a large group of seniors each year, although there is a declining trend from 1929 to 1933. Of the professions, the various engineering fields account for the largest share of choices. In group II, lower professional and large business occupations, the greater number of men indicate choices of business executive type of work, although again a decrease is apparent from 1929 to 1933. It may be that the decreases shown in the trends of choices of engineering and business executive positions are the beginning of more rational methods of choosing a career. But it is still obvious that groups I and II include the largest number of choices made by high school senior men. Law, medical work, and the sciences are constant from year to year in group I, and in group II dentistry, teaching and sciences also remain relatively constant. Social service work shows a slight increase and literary work decreases in frequency of choice.

In the men's choices classified in group III the trends remain constant from year to year, with slight increases in commercial work, technical sciences, and lower level teaching.

In group IV, the most marked characteristic is the steady increase in men's choices of agriculture or forestry, and skilled trades. The presence of these occupations in group IV is a function of the construction of the Brussell scale and may not reflect accurately the abilities required of modern agricultural positions in cooperatives, etc.; but in any event, the trends in the two types of occupations seem significant.

While engineering and other professions are still most frequently chosen by high school senior men, the steady decrease shown in group I is a hopeful sign. A similar decrease in choices of lower professional and business occupations is also indicative of a more favorable distribution of choices in line with the probable levels of abilities possessed by these students.[3] The attendant increases in groups III and IV

[3] E. G. Williamson and J. G. Darley. Matching Abilities to Jobs. *The Personnel Journal*, 1935, 13, No. 6, Apr., pp. 344–352.

represent a more adequate distribution of choices, although there is still room for improvement if one demands that the choices be distributed in the same fashion as abilities probably are distributed among these men.

Turning to a consideration of women's choices for the same period a different distribution is found in Table II. Most choices are found in groups II and III. Teaching shows a decline in frequency of choice from about 47 per cent to 42 per cent. Routine commercial work, technical services, and social service are chosen with increasing frequency throughout the five years. Choices of women are distributed over all six groups of the Brussell scale in a manner which is more consonant with the probable distribution of their abilities in contradistinction to the men, where a piling up in the first two groups is apparent. Part of this distribution may be due to the fact that fewer occupations are open to women and that they traditionally compete in certain well-defined occupations, such as teaching, clerical work, technician's work, and social service. On the other hand, men's choices may range throughout a wider selection of occupations and are limited only by the imagination and ambition of the individual student.

While some of the trends of Table II are indicative of the beginnings of a readjustment of choices to the actualities of supply and demand in the labor market, it is still apparent that employment trends and occupational information are not disseminated on a broad enough scale to influence the choices of high school students. Concentration of choices in a few traditional categories continues to exist, in spite of the fact that such concentration is not in agreement with known facts about corresponding distributions of abilities, interests, and opportunities. If students are permitted to enter a type of professional training solely because of an expressed interest in that profession, then society will have available many more workers in certain fields than can be absorbed under present-day economic conditions. It is more probable, however, that high school seniors are making their choices on irrational and

inadequate grounds, and that later experience will serve to readjust them forcibly to their proper economic level. Since forcible readjustment is often disastrous to the individual, it becomes the duty of counselors to attempt to redistribute occupational choices so that greater conformity exists between choices, occupational trends, and abilities and interests. Wider dissemination of factual material about occupational trends and opportunities must proceed simultaneously with coordinated studies of the individual students, so that counseling may be of service in problems of individual adjustment.

MECHANICAL ABILITY OF MORONS

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MORONS are usually classified as such on the basis of a test of general intelligence. They constitute a group according to Kuhlmann (2, p. 22) falling between 50 and 74 in IQ. The desirability of supplementing this classification in the interest of a more complete personality diagnosis, however, will be readily recognized. Clinical description of an individual for the purposes of prediction and guidance should become more adequate with the isolation and measurement of other relatively independent and socially significant traits. This is true in the case of the feeble-minded as well as for "normals." The *Minnesota Mechanical Assembly Test*, part of a more complete battery (3) of established value in measuring the mechanical ability of boys with average intelligence, suggested a useful addition to the diagnostic instruments of the clinical psychologist dealing with the feeble-minded. It was with the intention of exploring its use in this field that this study was conducted.

PROBLEM

The Minnesota investigators demonstrated that for a population of normal intelligence the test measures a trait which is relatively independent of intelligence but which correlates fairly high with an outside criterion of mechanical ability. For a group of 100 seventh and eighth grade boys ranging in age from 10–5 to 14–0 and in Otis Test IQ from 76 to 123, a

[1] For generous cooperation in securing the data for this study the writer is indebted to Dr. F. Kuhlmann, Director, Division of Research, Minnesota State Board of Control and to Dr. J. M. Murdoch, Superintendent, Minnesota State School for the Feeble-minded. He is also grateful to Dr. Kuhlmann, to Professor D. G. Paterson, University of Minnesota and to Professor M. C. Barlow, University of Utah, for their helpful criticism of the manuscript.

correlation of .06 with IQ and of .55 with a "quality" criterion (rating on quality of shop products made in school) were obtained (3, p. 238).[2] The specific questions set for this inquiry are: (1) To what extent will the generalization that mechanical ability is a trait which is unique with respect to intelligence hold when the range of intelligence is restricted to feeble-minded boys at the moron level? (2) Depending on the answer to the first question, what practical utility has the test for the clinician dealing with this group?

DATA

The data include the results from the administration of the *Kuhlmann-Binet Intelligence Scale* and the *Minnesota Mechanical Assembly Test*, Sets I and II, to 100 moron boys at the Minnesota State School for the Feeble-minded. The reliability of the complete Mechanical Assembly Test is .94; for the shorter form used in this experiment, the coefficient is .77 (3, p. 108). The cases were selected systematically to secure a representative sample of the moron population. Measures of central tendency and variability for pertinent data about the subjects are presented in Table I.

TABLE I

Age, Intelligence and Mechanical Ability of 100 Morons

MEASURES	C. A.	M. A.	IQ	MECHANICAL ASSEMBLY	
				Scores	Percentiles
Mean	15.75	8.96	63.55	97.50	15.85
S.D.	2.34	1.13	6.55	41.90	22.70
Range	10.5–20*	5.5–11	50–75	4–189	0–97

* Five cases exceeded 20 years.

Comparing these measures on the morons with the original data on the normal population studied by the authors of the Mechanical Ability Test (3, pp. 505–513), it should be observed: (1) The age range is comparable except that for the morons it is extended at the upper end, but not beyond the

[2] In subsequent comparisons this group will be referred to as normals.

percentile age norms for the test. (2) The IQ's of the morons, selected from about the lowest 4.7 per cent according to intelligence (1, p. 257), are definitely below and do not overlap the IQ's of the normals. The average IQ of the latter is about 100. (3) The mean percentile score of 15.85 in Mechanical Assembly for the morons is also distinctly lower than that of the normals which of course is 50. The variability, however, is very great and the inferiority of the group as a whole in mechanical ability is less than in intelligence.

ANALYSIS

1. Through what range of intelligence and to what extent are mechanical ability and intelligence independent traits? The correlation of .06, referred to previously, indicates that for a normal population, scores on the Mechanical Assembly Tests are practically unrelated to Otis IQ's. When the moron data are plotted in combination with the "Original Data: Experiment Proper," presented in the Minnesota report (3, pp. 511–513), the resulting correlation is .42. It should be noted that the morons comprise 50 per cent of this total distribution, whereas in an unselected population the percentage is less than 4.7. And therefore, because of the artificially selected composition of this population the correlation of .42 is without general significance. Moreover, inspection of the Scatter-diagram, figure 1, discloses that the higher coefficient is produced entirely by the piling up of very low Mechanical Assembly scores by about half of the morons. Forty-two per cent of them scored under the lowest score made by the normals. More significant, however, is the observation that the Mechanical Assembly scores of the morons completely overlap those of the normals. If we included with the normals only the upper 58 per cent of the morons, the two traits are quite independent, even for IQ's as low as .55. For that part of the scatter-diagram above 80 in Mechanical Assembly, which includes 58 morons and the entire group of normals, the correlation is .06; it is the same as for the normals alone, despite the marked extension in range of the intelligence variable. This

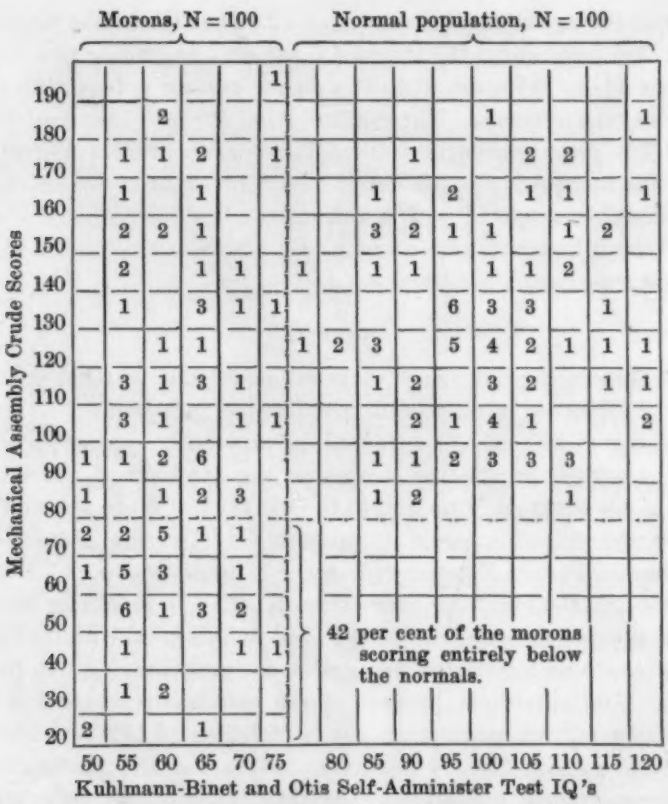

FIG. 1. Scatter-diagram of IQ (K–B, 50 to 75 and Otis, 75 to 125) and Crude Scores on the Minnesota Mechanical Assembly Test, Sets I and II, N = 200.

would suggest that within the moron range of intelligence a point is reached where intelligence and scores on the Mechanical Assembly Test begin to vary concomitantly. Further analysis of the moron data separately should reveal this range in which the two tests measure somewhat similar functions.

Comparisons for age, mental age, and IQ between the group of morons who scored below 80 in Mechanical Assembly, the lowest score obtained by the normals, and those who scored above this level follow:

MEANS	N.	C.A.	M.A.	IQ
Above	58	16.5	9.4	65
Below	42	14.9	8.4	61

It will be observed that the group scoring extremely low in Mechanical Assembly averages 1.6 years younger, and in mental age is 1 year below the morons who compare more favorably with the normals. The significance of these differences may be estimated from the correlations between Mechanical Assembly and the respective measures. Between Mechanical Assembly *percentile* scores and mental age the correlation is .27; the corresponding coefficient with IQ is .21.

By use of the Mechanical Assembly age-percentile indices, which correct for the crude score correlation with age, noted in the original research with normals (2, p. 271), the otherwise complicating age factor is eliminated in the intelligence *vs.* Mechanical Assembly correlations. That the percentile norms are also adequate (practically) in the moron range is affirmed by a correlation of a .10 obtained between C.A. and Mechanical Assembly percentiles on the moron population.

The relatively low positive correlations stated above of Mechanical Assembly percentiles with intelligence, through the moron range, are produced largely at the low ends of the intelligence distributions where scores are low in both tests. The range of M.A. is 5.5 to 11.5, but only 3 out of 15 with mental ages below 8 scored above the fourth percentile. Among the 7 cases with IQ's below 55, none exceeded the fourth percentile. Above these points, however, except for a piling up of low Mechanical Assembly scores throughout the moron range, the scores in the two tests are distributed over the scatter-diagram quite independently of each other. These data indicate an approximate point in the intelligence continuum below which the Mechanical Assembly Test becomes another measure of general ability and is therefore no longer a practicable instrument for measuring mechanical ability as an unique trait.

2. Of what practical use is the Mechanical Assembly Test in

clinical classification and guidance of the feeble-minded? For individuals with IQ's above 55 and beyond 8 in mental age the data presented show that the test measures a function which is relatively independent of intelligence. The distribution of Mechanical Assembly percentiles for the morons is presented in Table II.

TABLE II

Frequency Distribution of the Percentiles of 100 Moron Boys on the Mechanical Assembly Test

PERCENTILE	F	PERCENTILE	F	PERCENTILE	F	PERCENTILE	F
0– 4	52	25–29	3	50–54	1	75– 79	1
5– 9	14	30–34	2	55–59	1	80– 84	0
10–14	5	35–39	2	60–64	1	85– 89	0
15–19	6	40–44	3	65–69	2	90– 94	2
20–24	2	45–49	1	70–74	1	95–100	1

To appreciate the significance of this distribution it should be emphasized that the selection of morons includes individuals entirely from the lowest 4.7 per cent in intelligence of an unselected population (1, p. 257). The table shows that 52 per cent of the morons are approximately equally low in mechanical ability. On the basis of either test they might have been classified as feeble-minded. But, and this is very significant, some of the cases approach the extreme in deviation between these two traits. Four per cent of these morons exceeded the 75th percentile of a normal population in mechanical ability; ten per cent exceed the 50th percentile, and twenty-one per cent are above the lower quartile. The diagnosis of this special aptitude, to the extent and with the frequency shown, among a group otherwise seriously handicapped intellectually would appear to justify including the test as a part of the routine clinical examination of such individuals.

The survey for mechanical aptitude, however, may not require complete examination of the entire group. Riley has suggested a short-cut by which evidence of mechanical ability may be detected with the regular Binet examination (4).

Granting the possession of mechanical ability by some

morons, of what social value is its discovery? Apart from the possibility of selecting individuals from among the feeble-minded for mechanical occupations in society—a rôle for which there appears no economic need of their assuming and for which their own social limitations would perhaps preclude their accepting[3]—are there opportunities for the expression of this ability? At the Minnesota State School for the feeble-minded, typical perhaps of the larger institutions, inmates cooperate in so far as they are able in supplying the economic and social needs of the institution. Several mechanical occupations are open, including caring for and operating farm machinery; helping the electrician to test lights, repair fans, test and repair fuse-plugs, splice cords, etc.; assisting the carpenters in building construction and repair; working in the cabinet shop to repair furniture, make brushes, make and repair screens, etc.; aiding in care and repair of domestic machinery such as sewing machines and ironing boards, and assisting in the plumbing shop, paint shop, and power plant. For all of these activities it would seem economically advantageous to select individuals on the basis of probable proficiency. Perhaps of greater importance, however, is the result of "successful occupation" expected from the point of view of mental hygiene.

CONCLUSIONS

To explore the utility of the Minnesota Mechanical Assembly Test as an instrument for the occupational classification of the feeble-minded within an institution, it was administered to 100 moron boys who were also tested with the Kuhlmann-Binet Intelligence Scale. An analysis of the results justifies the following statements:

1. The mechanical inferiority of the morons as a group is indicated by a mean percentile score of 15.85. The moron distribution, however, completely overlaps that of the normal population.

[3] This assumption is without adequate proof; the occupational adjustment of morons *in society* is still a possibility.

2. A correlation of .21 between Mechanical Assembly and IQ for the moron range of intelligence shows a slightly higher relationship than for normals where the corresponding coefficient is .06.

3. Within the moron range the relationship is more marked at the lower end of the intelligence distribution. Below a mental age of 8 and an IQ of 55 the test ceases to measure a trait which is independent of intelligence.

4. Above this level the Mechanical Assembly Test measures a function which is relatively unique with respect to intelligence.

5. A cursory survey of opportunities for the expression of mechanical ability within an institution for the feeble-minded suggests ample justification for the selection of individuals with mechanical aptitude from among morons.

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A STUDY IN THE ESTIMATION OF FEELINGS

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INTRODUCTION

THIS experiment is a preliminary attempt to devise a method for determining self-estimates of feeling. In seeking for some means whereby individuals could estimate reliably their feeling on a quantitative scale, the writers decided to try the technique described by Cason.[1]

PROCEDURE AND SUBJECTS

In November, 1932, one hundred thirty-three male students taking the introductory course in Psychology were asked to fill out the feeling data sheet shown on page 380. The subjects were told that they could make any additional comments on the reverse side of the sheet. This form contained an exact reproduction of the feeling items used by Cason. The reliability of this technique was determined by a retest thirty days later.

RESULTS

Table I contains the means and sigmas for each item on the feeling data sheet for both the first and retest estimates. The last two columns show the means obtained by Cason for fifty college students and for his total group of eight hundred ninety-nine respectively. Since Cason reports that there were no marked sex differences, the comparison of his mixed group with our male group is probably not affected by this factor. The items may be identified by referring to the feeling data sheet. Items one through eight are the estimates for the various periods of the day; items nine through fifteen are the

[1] H. Cason. General Curves and Conditions of Feeling. JOURNAL OF APPLED PSYCHOLOGY, 1931, 15, 126–148.

FEELING DATA SHEET

NAME ..... DATE .....

I

If +5 represents the *best* anyone can feel, −5 the *worst* anyone can feel and 0 the *approximate average feelings of the whole population*, how would you grade your own most customary and representative feelings *at different times during the day?* Place a single number, as −2, +3, or +1, etc., before each of the following:

1. ———First half hour after getting up.
2. ———First half of the morning (excluding first half hour).
3. ———Last half of the morning.
4. ———First half of the afternoon.
5. ———Last half of the afternoon.
6. ———First half of the evening.
7. ———Last half of the evening (excluding last half hour).
8. ———Last half hour before going to bed.

II

If +5 represents the *best* anyone can feel, −5 the *worst* anyone can feel and 0 the *approximate average feelings of the whole population*, how would *you* grade your own most customary and representative feelings during the different *days of the week?* Place a single number, as +4, −3, or −2, etc., before each of the following:

9. ———Monday
10. ———Tuesday
11. ———Wednesday
12. ———Thursday
13. ———Friday
14. ———Saturday
15. ———Sunday

III

How do you generally feel during the different *months of the year*?

Grade each of the following by a single number on this same scale from +5 to −5:

16. ———January
17. ———February
18. ———March
19. ———April
20. ———May
21. ———June
22. ———July
23. ———August
24. ———September
25. ———October
26. ———November
27. ———December

IV

28. How many points on this scale from −5 to +5 *are your feelings made better* by *good* weather conditions?
29. How many points on this same scale from +5 to −5 *are your feelings made worse* by *bad* weather conditions?

TABLE I

Showing the Means and Sigmas for Each Feeling Estimate

ITEM	FIRST ESTIMATE N = 129–133		SECOND ESTIMATE (30 DAYS LATER)		CASON'S RESULTS (MALE AND FEMALE)	
					COLLEGE GROUP N = 50	TOTAL GROUP N = 899
	M	S.D.	M.	S.D.	M	M
1.	−0.5	2.5	−0.1	2.5	0.4	0.6
2.	0.9	2.1	1.5	2.0	1.4	1.8
3.	0.6	1.8	1.6	1.8	1.3	1.7
4.	1.4	1.9	1.2	1.9	1.3	1.6
5.	1.4	1.9	0.8	2.2	1.0	1.4
6.	2.0	1.8	1.6	1.9	1.8	1.8
7.	1.6	2.0	1.5	2.2	2.0	1.5
8.	0.8	2.2	0.6	2.5	0.9	0.6
9.	−0.3	2.6	−0.4	2.7	0.4	0.8
10.	0.7	2.1	0.5	2.0	1.1	1.5
11.	1.4	1.9	0.8	2.1	1.4	1.7
12.	1.2	2.0	0.9	2.0	1.4	1.6
13.	1.4	2.5	1.4	2.6	2.0	1.6
14.	3.0	1.8	3.0	1.9	2.5	1.8
15.	2.3	2.4	2.5	2.3	1.3	1.9
16.	0.2	2.5	0.3	2.4	0.8	0.7
17.	0.7	2.1	0.5	2.3	0.8	0.7
18.	1.1	1.9	0.9	2.1	0.6	0.7
19.	1.9	1.7	1.7	1.9	1.4	1.4
20.	1.6	2.6	2.0	2.3	2.2	2.1
21.	3.2	1.8	3.3	1.8	2.6	2.3
22.	3.3	1.8	3.2	1.9	2.6	2.0
23.	3.2	1.9	3.1	1.9	2.6	2.0
24.	2.5	2.1	2.5	2.2	2.4	2.2
25.	1.8	1.9	1.7	1.8	2.3	2.1
26.	1.1	1.9	1.2	1.9	1.5	1.4
27.	1.2	2.1	1.3	2.2	1.2	1.3
28.	2.2	1.3	2.3	1.4	2.5	2.5
29.	0.7	2.2	1.2	2.1	2.2	1.9

estimates for the days of the week; and items sixteen through twenty-seven are for the months of the year.

A remarkable agreement is shown between the means of this study and Cason's. The same principal conclusions stand out. There is a tendency for the feeling estimates to fall above the average. The average level of feelings is lowest during the first and last half hours of the day. The average level of feelings is lower on Monday than on any of the other days of the week. The average level is lowest in January, February and March. It is higher in the spring and summer and drops again in the fall.

The comments made by some of the students were very interesting and showed how the estimates were influenced by a number of extraneous factors that were difficult to control with this technique. First, memory was very important. Can one remember with any degree of accuracy how one feels the first half of the morning, or on Monday? Can one remember now in November how he felt last May? Furthermore, isn't the individual forced to make an estimate very close to average when he generalizes on how he feels at each of the various periods? It was also pointed out that the estimate was conditioned by the feeling tone at the present time. In addition some students observed that they answered the items in terms of how they should feel at the various periods. For instance, one might say about the month of June, "School is over and the summer vacation begins this month. The weather is fine. I suppose I should feel pretty good during this month so I'll put a plus five rating for June"; while for December, "It's generally very cold. I need a barrel of money for Christmas gifts, and by December I've overdrawn so much on my allowance that I can't ask my father for more money. And where the devil will I get money for New Year's Eve! I guess I feel pretty low in December and will mark that minus five."

For such reasons as these, the writers thought that this method of determining feeling for various periods was open to serious question; and therefore it was decided to check the

TABLE II

Showing the Correlations Between the Feeling Estimates Made Thirty Days Apart

ITEM	N	r	P.E.
1.	133	.54	.04
2.	133	.45	.05
3.	133	.37	.05
4.	133	.37	.05
5.	133	.32	.05
6.	133	.38	.05
7.	133	.42	.05
8.	133	.42	.05
9.	133	.49	.04
10.	133	.52	.04
11.	133	.42	.05
12.	133	.50	.04
13.	133	.58	.04
14.	133	.49	.05
15.	133	.63	.03
16.	133	.72	.03
17.	132	.60	.04
18.	132	.49	.05
19.	132	.35	.05
20.	132	.43	.05
21.	132	.41	.05
22.	132	.66	.03
23.	133	.63	.04
24.	132	.43	.05
25.	131	.40	.05
26.	129	.45	.05
27.	133	.52	.04
28.	130	.41	.05
29.	131	.38	.05
	Average	.47	

reliability of the feeling data sheet by means of a thirty-day re-test.

Table II contains the correlations existing between the estimations of feeling thirty days apart. There are great differences in the estimates. The coefficients range between .32 and

.72; the average coefficient is .47. The reliability of the feeling estimates seems to be very doubtful.

CONCLUSIONS

The average feeling levels for the various times of the day, days of the week, and months of the year agree very closely with Cason's results. However, these results have not a satisfactory reliability as determined by a thirty-day re-test. The average correlation is .47. The close agreement in the average feeling levels found in these studies may be spurious because of the operation of other factors which cannot be controlled by this technique.

EXPERIMENTAL STUDIES OF THE AFFECTIVE VALUE OF COLORS AND LINES

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THIS series of studies represents an attempt to determine the expressiveness of several different colors and forms, to discover by experimental methods the meaning, or affective state, or mood effect aroused in the observers by various colors and lines.

Tradition and lore in respect to the symbolic use of colors have been accumulating for many centuries, cultivated and perpetuated by churchmen, poets, artists, decorators and advertisers, and the symbolism of colors is now quite well organized and very generally and popularly understood. The meaning and interpretation of different kinds of lines and forms, of curves, ovals, angles, squares, etc., are perhaps not so widely and popularly and consciously employed and understood, but are none the less evident and consistent and effective.

Since the development of this symbolism has already reached such an advanced stage, it would seem impossible to isolate and identify for each hue and for each line the original and inherent meaning which may have made itself felt on the human organism. Social inheritance is so very important that not even the most careful introspector can free himself from its influence, and so very complex that not even the most carefully controlled experimental conditions can eliminate all the possible sources of error. There remain, however, many problems of practical importance and theoretical interest for which experimental techniques may be worked out. This particular series of experiments was designed to discover how consistent and general is the expressiveness of certain colors, red and blue, and for certain qualities of lines—circles, squares, angles, etc.

At the outset it will be interesting to note certain details in

the method of these experiments which differentiate them from previous experiments in the same field. 1. They are experiments in aesthetics meant to apply directly to the field of art. The elements to be studied are incorporated in a design which is made pleasing and interesting in itself and which is viewed by the subject in an attitude reproducing as closely as possible the attitude he would take toward a picture or other aesthetic object. This is quite different from the experiments on the apparent weight of colors, where the subjects lift cubes of different colors and estimate their weights, and a little different also from the experiments of Poffenberger and Barrows,[1] where all the stimuli were crowded together on one chart, and exposed to view simultaneously with no attempt to produce a pleasing or aesthetic effect on the observer. 2. The subjects record their reactions by checking adjectives from a printed list, and since they were not required to check any adjectives unless they chose to do so, the results represent more accurately the *actual* expressiveness of the line to the observer, not the expressiveness it *might* have if he were obliged to find one. 3. The isolation of the variable to be studied is accomplished in a different way—by constructing a graded series of designs each of which differs from the other in one respect only and each of which is presented to a different group of subjects to be judged alone and as a pleasing experience complete in itself.

These details in the method make it a somewhat more appropriate method for aesthetic material because it takes account of the cumulative effect on the observer in the recurrence of the characteristic line in various parts of the design. It is also more conservative for several reasons, first, because the subjects are not required to find a meaning for the stimuli unless a meaning appears to them spontaneously, and second, because it eliminates the contrast effect which enhances the meaning of certain lines or colors when they are compared with each other. The subject who has chosen the slow hori-

[1] Poffenberger, A. T., and Barrows. The Feeling Value of Lines. Journal of Applied Psychology, 1924, Vol. 8, pp. 1887–205.

zontal curve for the expression of quietness might be more inclined to choose a rapid rising angle for its opposite, agitation, when both lines and both judgments are so recently in his experience and present to his view.

The material for these experiments were designs and sketches made by art students under the direction of the experimenter. Sometimes as many as eight variations were made of the same design. They were mounted on bristol board and presented by the experimenter to groups of forty to forty-five undergraduate students in Laboratory Psychology. The large majority of the subjects were sophomores in the College of Science, Literature and the Arts, and about two-thirds of them were women. Variations of the same design were not presented to the same group except in a few cases when the extremes of one series, differing from each other quite markedly, were viewed by the same group. The design was exposed from three to five minutes and the subjects had plenty of time to study and revise their responses during that time. For each design the subject used a fresh copy of a list of adjectives, and was urged to check as few or as many adjectives as he liked. The adjectives, for the convenience of the subject, were arranged in groups with the adjectives of similar or related meaning placed near each other.[2] The votes for any one design were tabulated and recorded in terms of the per cent of the total possible number of votes. From these records a graph of the affective states aroused by each design could be drawn and comparisons made for the several versions.

In the first experiment eight variations of the same design were prepared in water color, four in red and four in blue. The saturated red matches fairly well with the Milton Bradley Red Orange. In working out the design tint number one and number two were used and shade number two. The blue matched very well with the Milton Bradley pure blue, and the same tints and shade of this blue were also used. The proportion of light to dark was constant in all the designs, as were

[2] For a discussion of the use of these adjective groups, see the author's Elements of Expression in Music (to be published).

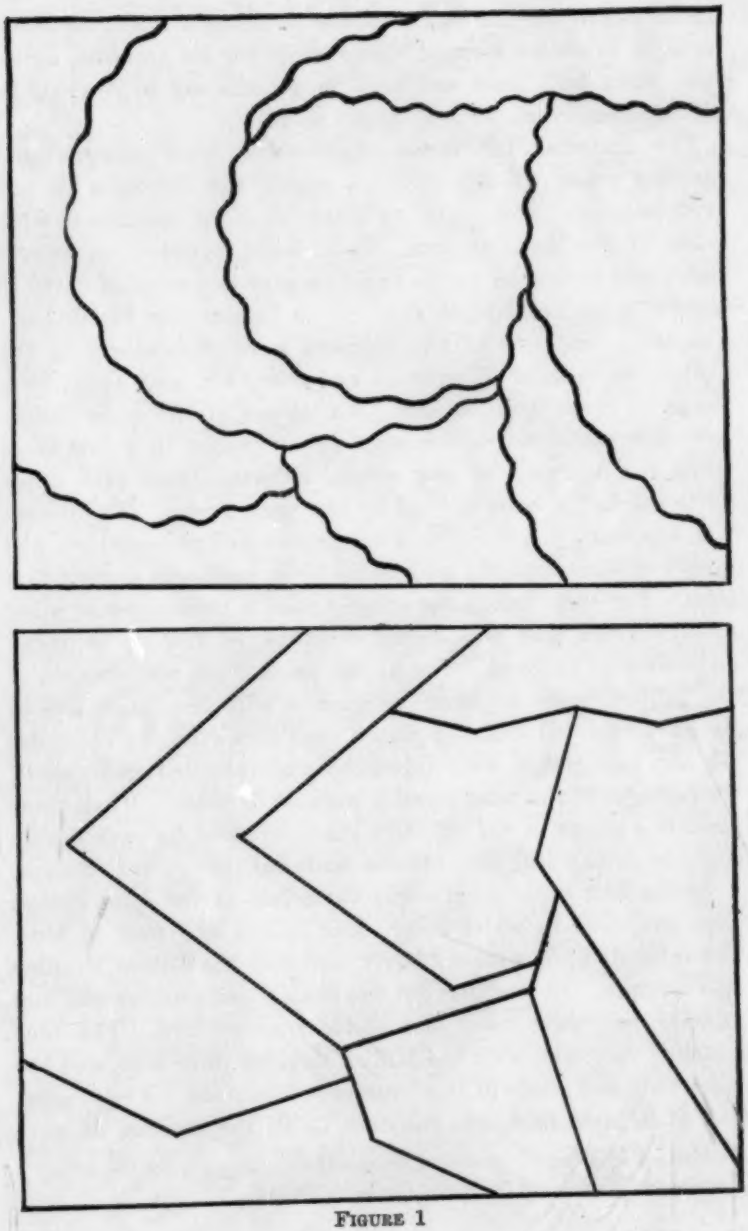

FIGURE 1

also the contour and size of the eight masses of which the design was composed. The boundary lines of the masses represented four different line qualities—circles, squares, angles and waves. Figure I shows two of these, angles and waves.

In reporting the results the adjectives are arranged in eight groups, with all the words of similar affective tone combined into one group and treated as a whole. The eight groups are numbered as follows:

Group 1	*Group 2*	*Group 3*	*Group 4*
spiritual	pathetic	dreamy	lyrical
lofty	doleful	yielding	leisurely
aweinspiring	sad	tender	satisfying
dignified	mournful	sentimental	serene
sacred	tragic	longing	tranquil
solemn	melancholy	yearning	quiet
sober	frustrated	pleading	soothing
serious	depressing	plaintive	
	gloomy		
	heavy		
	dark		

Group 5	*Group 6*	*Group 7*	*Group 8*
humorous	merry	exhilarated	vigorous
playful	joyous	soaring	robust
whimsical	gay	triumphant	emphatic
fanciful	happy	dramatic	martial
quaint	cheerful	passionate	ponderous
sprightly	bright	sensational	majestic
delicate		agitated	exalting
light		exciting	
graceful		impetuous	
		restless	

Table I gives the total number of votes for the adjectives in any one group for the eight different versions of this design.

The data in the last two columns of the table are represented in a bar diagram in Figure 2 in order to bring out the differences in the two colors. The adjective groups are arranged along the baseline from left to right, from group one to group eight. Although these groups cannot be conceived as representing a linear scale with measurable quantitative differences between them, there is a close relationship between any two adjacent groups which is readily apparent. The heights of the bars represent total votes for the adjectives expressed as a percentage of the number of subjects who viewed the designs.

TABLE I

Showing the Total Number of Votes in Each Adjective Group for Each Red and Blue Design

	RED WAVES	RED CIRCLES	RED SQUARES	BLUE ANGLES	BLUE WAVES	BLUE CIRCLES	BLUE SQUARES	BLUE ANGLES	ALL RED	ALL BLUE
No. of Subjects	46	50	50	40	50	40	46	46	186	182
Group 1	7	9	2	2	12	13	20	37	20	82
" 2	5	4	2	1	5	6	29	24	12	64
" 3	13	17	6	1	31	21	5	2	37	59
" 4	31	26	18	14	92	53	30	18	89	193
" 5	54	43	11	13	53	28	25	21	121	127
" 6	90	101	60	62	24	28	27	21	313	100
" 7	55	42	40	35	22	14	16	25	172	77
" 8	20	17	17	11	10	7	17	16	65	50

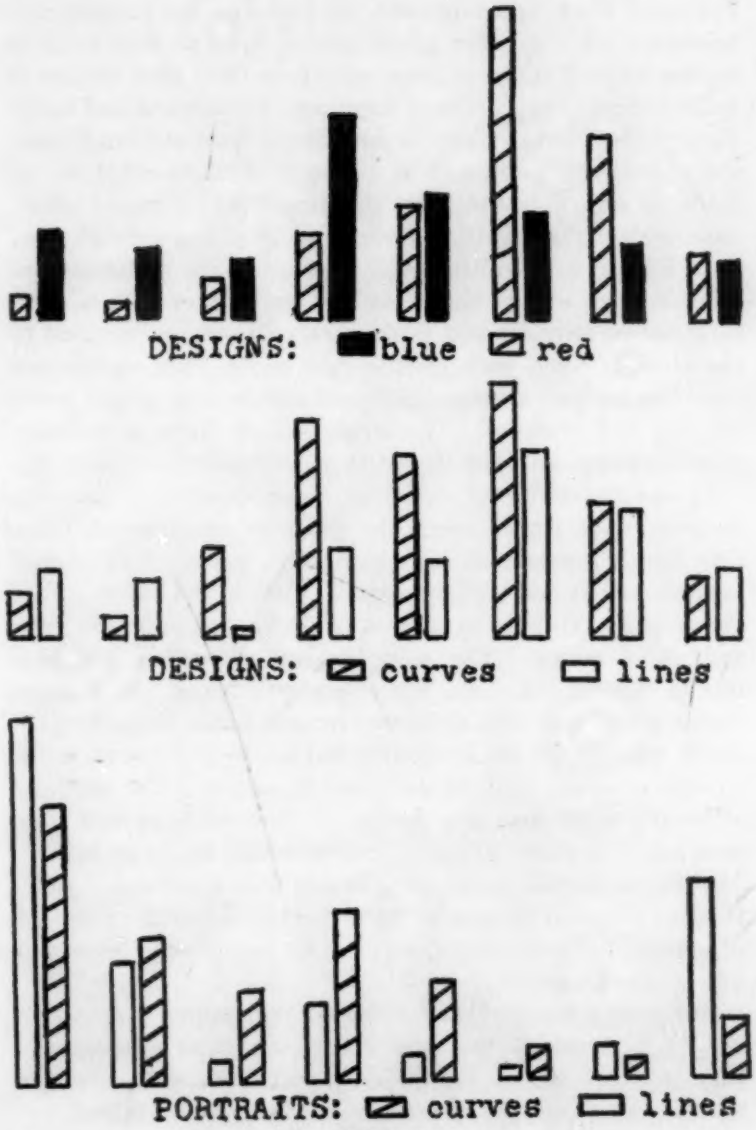
DESIGNS: blue red
DESIGNS: curves lines
PORTRAITS: curves lines

FIGURE 2

The solid black bars represent the blue and the striped bars represent the red. The graph shows that the blue color is expressive of dignity, sadness, tenderness, and that the red is quite decidedly expressive of happiness, restlessness and agitation. These findings are in accordance with the traditional use of the colors, although of course predictions could not be made in regard to the exact differences which would result from the use of a slightly different quality of hue or brightness.

In Figure 2 a similar graph represents the differences in affective tone which result from the use of curved lines, both slow curves (circles) and rapid curves (waves) in contrast to the straight lines, both squares and angle. The curves are more tender and sentimental, more serene and lyrical, more playful and graceful. The straight lines have a tendency toward sadness and dignity. Other differences are negligible.

In another series of drawings, four versions of portrait sketches were made, using the different qualities of lines. One sketch represented a human figure, seated, half turned toward the left and holding a small object in the hands. This sketch was carried out in squares, in angles, and in both smooth and rapid curves. The second sketch showed a standing human figure, full face, three quarters length, in a more dramatic attitude, with the arms bent and hands clasped. This sketch was carried out in squares and angles and in two styles of curves—ovals and longer smooth curves. The subjects never saw more than one version of these sketches and they were asked to check all the adjectives which might be used to describe the person whose portrait was thus presented. Table II gives the total number of votes for the different groups of adjectives, for each sketch, and for all the straight lines and curves taken together.

In Figure 2 the two types of line are represented graphically and it is apparent that the curves are more sentimental-yearning, more serene, more playful graceful, and the straight lines are more serious and much more vigorous and robust.

These differences coincide with the differences for the abstract designs, except that the portraits bring out a difference

TABLE II

Showing the Votes for Two Series of Portrait Sketches

	SKETCH ANGLES	I SQUARES	I OVALS	I WAVES	II ANGLES	II SQUARES	II OVALS	II SMOOTH	ALL CURVES	ALL STRAIGHT LINES
No. of Subjects	40	46	40	50	46	40	50	46	186	172
Group 1	64	69	27	56	105	80	59	118	260	318
" 2	9	22	16	22	56	15	34	64	136	102
" 3	1	7	30	14	11	0	8	22	74	19
" 4	15	29	46	41	15	5	10	63	160	64
" 5	6	5	11	37	4	1	31	14	93	16
" 6	0	0	12	2	2	2	13	3	30	4
" 7	8	5	2	1	5	6	11	2	16	24
" 8	26	52	2	7	29	63	41	1	51	170

on group eight which is not present in the abstract designs. This confirmation of meaning is all the more important because of the great difference in the kinds of material, and because of the differences in the absolute meaning of the two materials. The patterns of meaning for the designs and for the portraits are strikingly different with the modalities on opposite groups in the circle of adjectives. The relative meaning of curves *vs.* straight lines remain practically the same.

These relative differences in all cases may be evaluated more exactly by calculating the probable error for each adjective group difference, *via* Yule's formula and the Edgerton-Paterson tables.[3] Table III gives the ratio of the difference to its probable error for all the comparisons represented in Figure 2.

TABLE III

Showing the $\frac{D}{PE_D}$ *for Various Designs and Colors. A Positive Difference Indicates a Majority for the First Named Variable*

	BLUE VS. RED	CURVED VS. STRAIGHT LINES (DESIGNS)	CURVED VS. STRAIGHT LINES (PORTRAITS)
Group 1	−2.83	−1.09	−1.73
" 2	−2.80	−2.00	+0.78
" 3	−0.91	+3.60	+2.64
" 4	−3.05	+3.61	+2.88
" 5	−0.28	+3.17	+3.42
" 6	+5.14	+1.73	+2.00
" 7	+3.00	+0.44	−0.71
" 8	+0.54	−0.42	−4.00

A few of these ratios meet the criterion of 4 to 1 which establishes the difference as significant. The ratios are small largely because of the very conservative method of calculating the percentages on which the differences are based. For example, with the red and blue color in group four there is a vote of

[3] *Jr. Ap. Psych.*, Vol. X, Sept., 1926, pp. 378–391.

89 to 193, a substantial majority for the blue, but with more than 180 subjects for each color, and seven adjectives in the group, the number of possible votes is more than 1260, of which 89 and 193 are very small percentages. The graphs in Figure 2 probably bring out the differences more accurately, since a vote for every adjective by every subject is not a real possibility.

A study of the patterns of affective tone for the different designs and portraits in Tables I and II offers some very interesting comparisons. There is very little difference in the suggestiveness of squares and angles, and very little in the meaning of slow and rapid curves. The majorities always fall on corresponding parts of the adjective circle. Another interesting effect is revealed by the votes for the angles, in red and in blue. The combination of angles which are happy and restless, with the red color, also happy and restless, makes the most clearcut and definite of any response in the series. The voting is concentrated on groups six and seven, with very little scattering. On the other hand the exciting, happy angles, combined with the dignified serene blue color scatter the votes over seven of the eight groups so that no definite or clearcut meaning emerges.

One of the most important findings of the experiment as a whole is the consistency and uniformity of the subjects in interpreting the suggestiveness of these abstract designs. There is no doubt but that the artist's choice in the type of line is of the greatest importance in establishing in his audience the feeling tone which is appropriate for his subject matter. When everything else is equal,—size, color, contours, pose, design, balance, proportion and unity—the personality of the subject for the portrait is shifted from the tender, sentimental and serene to the dignified, strong and majestic simply by a change in the quality of the line.

One further study in this series of experiments is perhaps deserving of some mention because of the possibilities for further experimenting which it offers. An attempt was made

to discover the success of the artist in achieving a mood effect in keeping with his subject matter, solely by his use of line and color. For this experiment three different pictures were chosen; a portrait by a Mexican artist of a sleeping female figure, nude, painted in dull orange browns, yellow greens and mauves; a study of St. Peter, by El Greco, in somewhat brighter colors, greens, blues, oranges and browns, in a rather bold, emphatic style, and a fresco of St. Dominic by Fra Angelico, a portrait in very simple style, with a good deal of white, of dark blue, and of dull, pale background colors. A modified sketch of each picture was made in order to eliminate all the meaning or content of the picture, and reduce it to pure design. The lines of the picture were simplified, and necessary details such as hands holding a book were formalized into an abstract design, preserving the important color and line direction, but removing the representative quality. In the Fra Angelico, for example, the halo, the head of the youthful saint, the line of his tonsure, the blue line of his cowl and the white lining of his cowl form six interlacing ovals which with very slight alterations were made into an abstract design, pleasing but not suggestive of a young monk with cowl and halo, in fact not suggestive even of a human figure. Likewise, the most important lines of the sleeping Mexican woman and of the two smaller figures behind her were altered very little in abstracting the design of this picture. Merely by the omission of detail the content and meaning were removed to such an extent that the design became no more suggestive of a sleeping figure than of a landscape or other subject matter. The great difficulty in reproducing these designs was in matching the colors and achieving an effect in watercolor and crayon, comparable to the richness and subtlety of the original prints. Nevertheless, with our crude abstractions of the lines and colors of the artists, we asked our subjects to check all the adjectives appropriate, and Table IV gives the total votes for each group.

The sleeping female figure is primarily sad, an interpretation we attribute to the dull yellow brown colors, and it is also

strongly serious-dignified and calm and serene. These suggestions are all quite in keeping with the content of the picture.

TABLE IV

GROUP	NO. OF SUBJECTS	1	2	3	4	5	6	7	8
Fra Angelico St. Dominic	40	20	46	3	31	31	2	1	1
El Greco St. Peter	40	20	28	3	10	13	18	32	19
Sleeping Female (Mexican)	46	22	97	18	32	5	2	15	10

Fra Angelico's portrayal of St. Dominic is sad, tranquil, quiet and solemn, and there is a striking absence of vigor, restlessness and gayety! The votes in the playful-graceful group fall most heavily on quaint and fanciful.

The St. Peter of El Greco does not show the uniformity of opinion that the other two show nor is the interpretation as appropriate for the subject matter. To quote the adjectives which get the most votes, this picture is bright (16 of the 18 votes in this group are for bright, probably due to our use of strong primary blues and yellows), restless and agitated, vigorous and majestic, lofty, tragic and mournful.

SUMMARY

The expressiveness of two colors, blue and red, has been studied by preparing two versions of four designs, one in red and one in blue, and asking subjects to check from a printed list all the adjectives which were appropriate to the design. In summarizing the results, the adjectives have been arranged in groups so that the pattern of feeling tone for each design may be expressed graphically. The results show that red is happy and exciting and that blue is serene, sad, and dignified.

Different qualities of lines were studied by the same method,

and also by making four versions of the same portrait, in four different kinds of lines. Curves are found to be serene, graceful, and tender-sentimental. Angles are robust, vigorous and somewhat more dignified.

Abstractions of the lines and designs of three different paintings were also evaluated by means of the adjective list and the results show that the patterns of response are consistent and uniform for most subjects, and quite in keeping with the subject matter of the artist.

THE FIRST COURSE IN PSYCHOLOGY AS A GUIDANCE PROJECT

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IF one is to do counseling of college freshmen that will have value it is necessary that one know his students well—that one know them scientifically, objectively, and (in the absence of valid and reliable measures of personality, perseverance, and industry) by observation during work. It is also necessary to impart to the subjects the essentials of job-wisdom, occupational requirements, and social understanding. The purpose of this paper is to suggest that the introductory course in psychology offers a good opportunity to secure the needed information concerning students for guidance purposes and to impart to them the information that they need.

There can be little doubt that it is necessary to teach students early in the psychology course that the method of psychology is experimental. It is rather startling to many students to find that the scientific method can be used in the study of human beings. They think of the scientific method in connection with physics, chemistry, and biology, but rarely think of it in connection with the investigation of their own abilities and the occupational world about them. The novelty of using human beings as experimental subjects arouses a great deal of interest and the teacher who is aware of the guidance problem can use this interest in the development of self study and self discovery.

The study of the unit on *intelligence* can be approached by consideration of the limitations imposed by this factor on the probability of vocational success. Occupation differences in requirements, if properly presented, are of great interest to students. If the students take intelligence tests at the time this material is presented, know how the tests are built, understand the general theory behind intelligence testing, and are

taught to interpret their own score in relation to the distribution of scores of the population as a whole and to occupational groups in particular, there is an opportunity to do the kind of guidance that is most likely to be effective—the kind in which the student knows on what facts his occupational choice is made.

Reaction time experiments are usually of much interest and application of results can be made to various occupations. Let the aspiring athletes in the class hear that Babe Ruth owes much of his success to speedy reaction time—that even small differences in reaction times of players on a football team make great differences in the effectiveness of such a team, and an experimental set-up for the measurement of reaction time will soon be demanded. If the laboratory work can be followed up by demonstration on the baseball or football field much can be done in the prevention of failure and the encouragement of probable success. Application to other activities, from factory machine operating to automobile driving, can be made and demonstrated.

The study of the problems of *learning* is a fertile field for study of one's self and of occupational requirement. The writer has found it much easier to teach the facts about learning curves by having students make their own curves, than by study of the curves prepared in textbooks. It is not difficult to set up a learning situation that is required in a certain occupation—say the occupation for which most of the students have expressed a preference—have them learn some of the occupational material and draw their own learning curves. Such a procedure serves to teach facts about the learning curve so that they will stay taught, presents a type of tryout which is of value in assisting the people at the extremes of the "amount-learned-distribution" to inquire whether or not they should go on with their tentative occupational plans, and affords an introduction to a field of activity that some students have overlooked as an occupational possibility, The whole problem of *sense-organ efficiency,* and of *musical aptitudes* may be treated similarly. Demonstrations can usually be depended

upon to result in requests to "try that test," and the results of the testing are of great value in counseling interviews.

The study of learning offers further assistance when students get to the point at which they will accept the importance of learning in development of occupational fitness. One can find in freshmen classes students who still believe that they are prepared by inheritance for particular vocations because their parents possessed vocational aptitudes, because certain abilities "run in the family," or even in the racial group. When these students finally arrive at the point at which they believe that "no trait can be called native until it has been definitely shown that training of some sort is not responsible for it," we can discuss with them the possibilities of training in fields in which they have abilities, but which they had not considered because they thought they were not "born that way." The study of learning in addition to the values usually attributed to such study may result in considerable widening of vocational horizons.

The study of *efficiency* offers a good opportunity to provide occupational information, avocational information, and the study of individual effectiveness in relation to these activities. The study of the working-period, for example, will give students some reliable data on which to reach conclusions concerning claims for shorter hours and for changes in work routine. Studies of fatigue and work output, day-by-day variations in production, effectiveness of rest periods, and accident proneness will enable the student to appreciate some of the problems of industry even though he is never actively employed in situations where these are highly important factors. Studies of the influence of alcohol, nicotine, caffeine, and diet upon personal efficiency may not only be of value in relation to the student's behavior but may be of value in understanding controversial problems which affect workers. Studies of ventilation, illumination, and noise in relation to efficiency can be tied up with controversial issues concerning working conditions and occupational diseases,—and the study of *motivation* ties up very neatly with the problems of monot-

ony in industry. If the study of these factors leads only to realization of the complexity of the work situation, it will result in a greater degree of understanding, and perhaps tolerance, in labor disputes.

The work on *emotions, feelings,* and *personality* provides an excellent vehicle for the teaching of the facts of "job-wisdom." To what extent the teachings concerning emotion and personality affect the behavior of the student we cannot be sure, but it does appear that if these things are taught in relation to job-wisdom instead of being taught as so much material that is to be learned for examination purposes only, there will be some carry-over. If temper tantrums can be tied up with job-losing and loss of efficiency—if the study of the sex-drive can be tied up with more social efficiency, and if attitudes of superiority and inferiority are tied up with the problems of insubordination and "getting along with the fellow worker," there is some reason to believe that the teaching may be of considerable personal and social value.

The illustrations given above could be multiplied many times for there is no part of psychology that cannot be tied up in some way with the problems of self-discovery, occupational information, job-wisdom, and social understanding. These are classroom projects, however, and form only one part of the guidance program. If the student is really going to learn the psychological method he will need to do some experimenting of his own. The carrying out of simple experiments offers the opportunity to observe the student at work. The instructor can observe whether or not the student is industrious, can observe whether he sticks to a task and sees it through, can observe how he reacts when he meets difficulties, can observe whether or not he will "cook" his results, and can observe whether or not he shows any special abilities or disabilities.

Interviews concerning experiments provide an opportunity for the study of students, a chance to get acquainted and a chance to talk about the future. This writer would never have known that a certain student in a large class suffered from

strong feelings of inferiority, from feelings of insecurity, from delusions that people were watching him as he walked along the street; and that these feelings were making him a very inefficient and very unhappy person, had not that student in a very mild manner expressed his desire to get his experiment requirement completed by making a stylus maze. The construction of the maze in the writer's office gave him an opportunity to study the individual, to find out the peculiarities noted above, and find out that the student had a very great interest in mathematics. As a result of the finding of the difficulties and as a result of their treatment the student has regained self-confidence, to the extent that he will ask questions, even argue, not only in psychology but in his other classes. His mathematical interest has been utilized by teaching him several simple statistical procedures and the reputation that he has developed as the school statistician has given him more self-confidence than he has had at any time for many years. The carrying out of a simple experiment has led to the development of this bright student from an unhappy, inefficient individual to a very well-adjusted, wholesome individual.

In any large group of students one is sure to find many students who might be said to be suffering from (with due consideration to the misuse of the words) inferiority complexes. Giving these people an opportunity to express themselves by reporting to classes the results of their experiments is one step toward recovery. Here is one thing that they can feel sure of because they have done it themselves, and they get a great deal of satisfaction from the reporting experience. When this procedure is followed up by allowing these students —once the ice is broken—to report other experiments and special readings to small groups of their fellow students—a long step has been taken in the breaking down of the inferiority feeling.

A psychology student who was talking to a group of doctors at a hospital for the feeble-minded during a class visit to that institution was heard to remark: "I really don't feel qualified to express an opinion on that problem." The remark was the

subject of much comment among his fellow students for it was the first time that he had been known to make such an admission in public. His fellow students had considered that he was suffering from grandiose delusions. It was only when he had begun to learn in psychology class, and in counseling interviews, that his prejudices and opinions had been built up, often with a lack of valid and reliable information, that he began to realize that he "didn't feel qualified to express an opinion on that problem." The growth here is most remarkable when it is noted that this student had recently lost a newspaper position because he had tried to tell the editor of that paper just how it should be managed. He is acquiring an essential job-wisdom.

The illustrations given here are presented to show some of the possibilities of the course in psychology as a guidance project. It has long been claimed that psychology is valuable in helping in the understanding of oneself, an important factor in the fitting of one's self for the life that is ahead. In that life ahead the problems of getting the best vocational adjustment and social undertaking are dominant. We must stress these problems, make them an important part of our course, and consider our course a failure unless it has done something to assist in the solution of these problems. Our critics may say that in doing so we may lose some of the academic treatment, that we shall have to write new psychology textbooks, that the students will be led into the more practical rather than the academic viewpoint on the subject and in answer to all these criticisms it is well to point out that the psychologists have not answered adequately the challenge of society to apply some of their findings to social problems of the day. As Griffith[1] has pointed out, psychology will become important to the student when he is assisted in the answering of questions concerning his own abilities, his future as a productive member of society, and his choice of a life task.

[1] C. R. Griffith. An Introduction to Applied Psychology, New York, Macmillan, 1934.

THE CURVE OF LIFE AS STUDIED IN BIOGRAPHIES

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I. PROBLEM AND METHOD

WHEN studied biologically the human life has a very definite, regular course. Up to a certain average age of about twenty-five years, growth and increase of strength can be determined; then the vitality remains at approximately the same point for about twenty to at the most thirty years and finally, due to retrogression, the vitality decreases gradually or quickly. Our problem is to determine whether or not one can establish a similar, regular curve in the attitudes toward life and in the attainments spiritually as well. We investigated about three hundred biographies and made about three hundred anamneses of people of various ages and professions. We differentiate three groups of dates which we set up:

(1) *External events* in life such as the age-limits of the preparation for a profession; dates marking the beginning of the career, the advancement to higher positions; the betrothal, marriage, births of children; the acquisition and loss of social, love, and friendship connections, etc.

(2) *Inner experiences* in the sequence of their occurrence. These we derived from private letters, diaries, and similar definite material from which we could learn whether expressions of well-being, complaint, hope, desire or resignation, ambition, or plans occurred in any definite, regular period of life or whether the distribution of these was entirely different for each individual.

(3) *Dates of work and accomplishments during life.* Here we tried to set down the period of the accomplishments and successes in the life-histories statistically. We found means

of counting not only the various works of scholars and artists and the appearances and varying incomes of stage artists, but also used the inventions of engineers, the enterprises of business people and the increase and decrease in their wealth; we used the political speeches, acts, and diplomatic undertakings of politicians and the attainments and records of athletes. We also found statistical means of determining the work of factory people in various industries.

II. RESULTS

The theoretical results are not to be emphasized at this time, but rather the most important practical results. First, it has been determined that in spite of all individual irregularities, there is positively a *regular sequence* in the events, experiences, and attainments in life. The events, experiences, and attainments show, first, a period of expansion, of stability and of restriction parallel to the biological curve. In other words, in the first part of their lives, all human beings are concerned with the enlargement of their opportunities in life, their position, their activities as well as with the increase of their knowledge, abilities, pleasures and diversions, and so forth. Then comes a period in which a certain high point is reached; this stage is maintained for a time but is not exceeded although it can still be renewed after losses repeatedly. Finally, however, there follows either willingly or unwillingly the restriction, the relinquishing or the loss of positions and activities; the limitation of the associations; of income; fatigue, decreased efforts and lessened ambition; loss of men who are no longer replaced, etc. The ability and accomplishments also show a corresponding increase and decrease. However, now it can be ascertained that the *psychological increase and decrease compared to the biological increase and decrease* is retarded, that is, the curve rises slower, culminates later and falls later than the biological curve. It follows the law that in the magnitude in which *spiritual factors* predominate in the activity and in the attainments of the individual, the *high point* is deferred to the end or latter part of life, and

that in the proportion in which *physical factors* such as strength, or beauty are the deciding features in the life of an individual, the high point is reached earlier and the psychological curve is more comparable to the biological curve. The same is true of the *curve of work and attainment* which reaches its high point either early or late in various categories of accomplishments and professions; for example, it culminates very early in a certain class of workers, athletes, and artists; on the other hand, it culminates very late in the lives of diplomats, philosophers, and certain kinds of scholars. In another category of workers, artists, and athletes, and in the majority of all professions in which physical as well as spiritual activities enter in, such as engineers, business people, doctors, explorers, officers, teachers, officials, nurses, salesmen, servants, etc., the curve culminates in the middle.

The events, experiences, and accomplishments in the course of life reveal a second law, the *tendency to specification and definite results.* During adolescence every young person begins to make life plans, that is, he thinks about what he wants to become, he studies or becomes an apprentice and tries this or the other profession. In a very large percentage of instances, the profession first undertaken is later changed, partly because the chances are unfavorable but usually because the young person discovers that he can do something else better or that another occupation promises him more, or similar reasons. We can say, therefore, that at the beginning of life the activities have a preparatory or provisional character. We call that *non-specified activities.* Not only the professional activities have this non-specified and provisional character but also the personal connections of the young person. His first love is seldom lasting. The same course of provisional, preparatory, and non-specified activity can be shown with definite criterion in the experiences and works of the early stages of life. At about thirty years of age a change occurs. With amazing coordination we find in all correspondences of this age expressions of a need for that which is *definite:* the "right" and definite profession, or the "right"

wife. We establish also in these objectives dates that people settle down now in marriage, in a place where they expect to stay, or in a definite occupation. People who have a choice have found out and decided by now which occupation suits them best and for which they are best fitted. We call this period the period of *specification and definiteness* in work and personal relationships. About fifteen years later, a new change takes place. One begins to test the *results* which have been accomplished up until now, namely, whether one has obtained all that one wanted, the position, the success, and the income for which one strove. For some reason or other, every one is not satisfied with the results which he has achieved. There now comes a period in which the realization of the desired success is the main object in life. This period can be of varying duration. It is ended only through the new attitude of the aging person *who looks back on life* and begins to finish off with life. To this period, which to a certain extent lies after life, corresponds the period of childhood and youth which lies, so to say, in front of life, so that the complete life is made up of *five* phases.

III. APPLICATION OF THE RESULTS

What, then, is the practical value of this research? A series of special works showed the significance of these investigations for the following problems:

(1) for questions arising in the *choice of a career in life*
(2) for the *medical* problem of the *healthy and sick*, the *normal and abnormal spiritual development* in life
(3) for *business* and for the *enterpriser* in respect to the question, in what age are workers and employees best suited for certain business?
(4) for public welfare in respect to the *inability to work* or *weariness of life*
(5) for *insurance*, in the problem of duration of life and unemployment
(6) for *advice in marriage* in respect to the favorable age for marriage.

Ad (1)* Facts have been derived and with the methods of life-psychology it is easy to establish further fact in the following questions: when is the most favorable time for selecting a career and for preparing for a career? How can one judge the changing of a profession in various stages of life? What can one do for a normal development of a career?

Ad (2) How do sicknesses of various sorts influence life and the development of a career?

Ad (3) Facts concerning the *favorable ages* for the activity of workers and employees in various sorts of industries have to some extent already been made and can easily be worked out on a larger statistical basis.

Ad (4) In the problem of *suicide* and the motives which lead to it, as well as in the problem of the *effect of unemployment* on various ages and in the *effort to combat with these effects,* material has been collected.

Ad (5) Short and long life histories were studied and from the manner of living there seemed to be definite indications as to the length of life. To investigate this more closely might prove valuable to insurance companies.

Ad (6) In the advice in marriage the knowledge of the attitude toward life of certain ages can prove to be of greatest value in order to judge the prospective duration and compatibility of a planned and existing marriage.

All these problems which are of practical importance have only been investigated in a preliminary manner and the prospect of applying this new research practically depends upon the extent to which greater amounts of material can be investigated.

* Editor's Note: It is understood that the author by "Ad 1, Ad 2, Ad 3, etc." intends that the reader shall understand that what follows in each case is a statement of suggestion for further research growing out of the present study.

PATTERNS OF JEWISH TEMPERAMENT*

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THIS paper completes a series of rating-scale studies on the Jewish personality.[1] The questionnaire which was used throughout the series is the Bernreuter Personality Inventory, a three-step, self-rating scale of 125 traits on a list culled from the literature of psychopathology and mental measurement. From three fairly representative samples it was surmised that Jewish introspections on "neurosis" were somewhat distinctive, though not decisively so. What difference there was in average temperament seems to be corroborated by superficial observation, though, to be sure, its significance is obscured by the limitations of self-report and by present inability to disentangle nature and nurture.

The study is concerned with an item-analysis of the Bernreuter blank as responded to by a typical sample of Jews and non-Jews. The method permits both a closer picture of Jewish personality and an approximate means of interpreting the race difference thus disclosed.

RE-STATEMENT OF CONDITIONS

One hundred fourteen Jewish students and their parents were subjected to the Bernreuter form. A like number of non-Jewish families were selected as a control group. All of the students in question were enrolled at Western Reserve University. Jewish and non-Jewish students were paired in economic level, college aptitude, age, and permanent residence

* This study was subsidized by a Grant-in-Aid from the Social Science Research Council of New York City.

[1] Keith Sward and Meyer B. Friedman, Jewish Temperament, *J. Appl. Psychol.*, 1935, 19: 70–84.

Keith Sward and Meyer B. Friedman, Family resemblance in temperament, *J. Abn. & Soc. Psychol.*, in press.

in Greater Cleveland.[2] The non-Jewish subjects were North European Protestants. The Jews, mostly Polish and Russian, were identified on the say-so of the individual and were pure or unmixed within a range of two generations. The racial angle of the study was not disclosed, the family-analysis having been held out as the *raison d'être*. Two devices were used to control rapport: a preliminary conference with each student and a cautious standardized system of follow-up whereby scores were reported back to each family.

METHOD OF ITEM-ANALYSIS

Four sets of data are examined separately: the blanks of 114 Jewish fathers, 114 Jewish mothers, 56 Jewish boys, and 58 Jewish girls. The non-Jewish norm is made up of similar age and sex groups.[3] For a given age and sex group, the raw frequencies on each of the three steps for a particular item were converted into per cents and the rate differences were evaluated in terms of the sigma of the difference. The statistical results are assembled in Appendix I. Each Table lists only the traits which distinguished the Jewish subjects or the items on which there was a significantly larger Jewish response than non-Jewish.

THE RESULTS

The lines of Jewish temperament about to be drawn constitute a significant introspective document. They fill out the picture of what H. A. Miller wrongly labelled an "oppression psychosis."[4] Subjectively, the Jewish temper displays an

[2] The Jewish incidence in several important centers of population is a point of comparative interest. U. S. A., 3.58 per cent; New York City, 30 per cent; Philadelphia, 13 per cent; Boston, 11 per cent; Chicago, 10 per cent; Cleveland, 9 per cent; and Cleveland Heights, having a general population of 50,000, 34 per cent.

[3] One non-Jewish family, consisting of a triad of daughter, father and mother, was dropped from the item-study due to loss of the blanks. Therefore, non-Jewish frequencies are distributed as follows: 113 fathers, 113 mothers, 56 boys, and 57 girls.

[4] The term *neurosis* is apparently coming to mean the borderline symptoms lying between the normal and the extremities of abnormal or psychotic behavior. Miller meant to imply neurotic, rather than psychotic, symptoms.

inferiority attitude or a mass anxiety neurosis, not unlooked for in a people long embroiled in race conflict. There seems to be some point in a quantitative account of Jewish feelings. Hardly any field of social psychology has labored under a greater load of misconception. A specific description of Jewish self-attitude is now in order.

For convenience, the introspections are grouped under several interpretive labels. Each cluster is defined herewith.

(1) *Gregariousness or social hunger.* By this heading it is implied that Jewish folk have an over-developed need for intimate social appreciation. The normal desire for response is intensified in the Jew, no doubt, because of Gentile rejection. Such a drive would explain the oft-remarked cohesiveness of Jewish cultural ties, as well as the collective emotion—profuse verbalizing and irrepressible minor displays—to be seen among Jews responding to one another in the absence of non-Jews.

(2) *Humility and sensitiveness.* Tender-mindedness is a Jewish modality, if one is to judge from the ratings. Such a shading of behavior is corroborated by the long record of Jewish attainment in letters and the arts. The over-sensitiveness and the feelings of inferiority have a double significance: in *behavior* such attitudes may outcrop directly in submissive demeanor or indirectly at the core of over-compensation. It may well be that the mere declaration of retiring inclinations partakes of the nature of a defense mechanism. This would apply with special force to over-keyed behaviors which are popularly conceived as unesthetic "Jewish" mannerisms, *e.g.*, on the items, "looking for an argument," "pushing to the front," and the like.

(3) *Drive and aggressiveness.* Conversely, over-reaction is a characteristic of Jewish self-attitude. Enhanced motivation and vigorous compensations are the complement of undertoned feeling. In fact, this paradox of Jewish introspection reflects a certain bi-modality of temperament. That is, in response to social exclusion the Jew either gives up the struggle (beautifully illustrated in the classic facial expressions of some antiquated Jews) or takes on new life. Social evidence

of the latter is multitudinous, *e.g.*, the very survival of the race, the Jewish intensity in most lines of endeavor, the notable intellectuality of the people, as well as the narrowly egoistic reactions in terms of which this or that mannerism is catalogued as "crowding," insensitive, officious, or thick-skinned.

(4) *Emotionality or instability.* Under this heading are placed the items which ally themselves with a generalized nervousness. Perhaps the label of "anxiety states" is as good as any. These attitudes indicate a state of insecurity which tones and underlies an indeterminate area of Jewish adjustment. Excessive worry, preoccupation with the self, hypochondria, and unprovoked mood-changes, are typical of the general designation.

(5) *Miscellaneous items.* The tag ends of unclassifiable behavior are listed at the bottom of each Table.[5]

The items in Table I pertain to the self-report of Jewish and non-Jewish fathers. The critical ratios, based on the sigma of the difference, range from 7.6 to 3.15. A serial order of decreasing values is used within every category. That is, the most significant items have been placed at the top of each pattern-list.

[5] Comparing the item-analysis with the study of means and variability, one notes a disparity. Jewish means were not significantly different from non-Jewish means, though consistently further along in the direction of inferiority and neurosis. Yet the item-analysis contains an assortment of traits that are significant numerically and qualitatively. Of the two ways of expressing the same data, the item-study gives the better picture. One questions the adequacy of the general neurosis score of a rating scale, except as the very roughest of devices. For Jewish temperament, gross scores on the Bernreuter form camouflage important internal qualities of make-up. Two constituents of the Jewish temper—their collective gregariousness and their over-reaction—which may be considered as neurotic in degree, are weighted in a non-neurotic direction on the Bernreuter key. This amounts to saying that a general rating scale fails to do justice to qualitative parts within the whole. Anxiety feelings and an inferiority drive are relatively generalized among Jews, yet the manifestations of the oppression-complex are detectably bi-modal: towards under-toned and over-toned poles.

TABLE I

Introspections Which Distinguish Jewish Fathers

(See Appendix I for the differences and their significance)

Gregariousness or social hunger

1. Especially like to have attention from acquaintances when I am ill.
2. Often experience periods of loneliness.
3. Would dislike any work which might take me into isolation for a few years, such as forest ranging, etc.
4. Find that people are more stimulating to me than anything else.
5. Am usually considered to be indifferent to the opposite sex.
6. Like to be with people a great deal.
7. Usually prefer to plan with others rather than do my own planning alone.
8. Prefer not to be alone at times of emotional stress.
9. Find conversation more helpful in formulating my ideas than reading.
10. Want someone to be with me when I receive bad news.
11. Usually prefer not to keep my feelings to myself.

Emotionality or instability

12. Often feel just miserable.
13. Experience many pleasant or unpleasant moods.
14. Cannot stick to a tiresome task for a long time without someone prodding or encouraging me.
15. My interests change rapidly.
16. Am easily moved to tears.
17. Some particularly useless thought keeps coming into my mind to bother me.
18. Often find that I cannot make up my mind until the time for action has passed.
19. My feelings alternate between happiness and sadness without apparent reason.
20. Usually express myself better in writing than in speech.
21. Am often in a state of excitement.
22. Have difficulty in making up my mind for myself.
23. My mind often wanders so badly that I lose track of what I am doing.

Humility and sensitiveness

24. If I were hiking with a group of people, where none of us knew the way, I would probably let someone else take the full responsibility for guiding the party.
25. Give money to beggars.
26. Prefer travelling with someone who will make all the necessary arrangements to the adventure of travelling alone.
27. Dislike finding my way about in strange places.

28. Don't usually object when a person steps in front of me in a line of people.
29. If I came late to a meeting I would rather stand than take a front seat.
30. Usually try to avoid arguments.
31. Find it difficult to get rid of a salesman.

Drive and aggressiveness

32. Try to get my own way even if I have to fight for it.
33. Tend to be radical in my political, religious, or social beliefs.
34. Discipline makes me discontented.
35. Athletics interest me less than intellectual affairs.
36. Would rather work for myself than carry out the program of a superior whom I respect.
37. Usually ignore the feelings of others when accomplishing some end which is important to me.
38. Don't keep in the background at social functions.

Miscellaneous behavior

39. Am not systematic in caring for my personal property.
40. Am not thrifty and careful about making loans.

A third of the Bernreuter list, or 40 items, diagnose Jewish attitude, according to the accepted standard of reliability, where the difference is three times the standard error of the difference. Twenty-one items have values of 4 or higher. The median ratio is 4.06. Twelve items yield a gross differential of 20 or more in per cents. As indicated, the patterns of Jewish personality for adult males are four-fold: (1) An undue need for attention or social response, (2) Self-effacing attitudes and over-sensitiveness, (3) A complementary note of over-reaction and intensified drive, and (4) Feelings of insecurity. It might be added that the miscellaneous items which profess an indifference to pecuniary matters on the part of Jewish adults are somewhat obscure, though possibly unimportant. They may reveal a difference in opulence, a true difference in character resulting from Jewish caricature, purely a compensatory attitude unparalleled by behavior, or a circumscribed trait adopted by Jews among Jews.

In Table II we have a similar classification of the differential self-ratings of Jewish mothers. See the preface to Table I and the Appendix for details of arrangement.

TABLE II

Introspections Which Distinguish Jewish Mothers

(See Appendix I for the differences and their significance)

Gregariousness or social hunger

1. Often experience periods of loneliness.
2. Prefer not to be alone at times of emotional stress.
3. Find that people are more stimulating to me than anything else.
4. Like to be with people a great deal.
5. Want someone to be with me when I receive bad news.
6. Am usually considered to be indifferent to the opposite sex.
7. Make new friends easily.
8. See more fun or humor in things when I am in a group than when alone.

Emotionality and instability

9. Worry over possible misfortunes.
10. Often feel just miserable.
11. Am often in a state of excitement.
12. Ideas often run through my head so that I cannot sleep.
13. Am easily moved to tears.

Humility and sensitiveness

14. My feelings are easily hurt.
15. Am touchy on various subjects.
16. Usually try to avoid arguments.
17. Give money to beggars.
18. Don't usually object when a person steps in front of me in a line of people.
19. Can't stand criticism without feeling hurt.
20. If I came late to a meeting I would rather stand than take a front seat.
21. Would not have it out with a person who spread untrue rumors about me.
22. Have not been the recognized leader (president, captain, chairman) of a group within the last five years.

Drive and aggressiveness

23. Heckle or question a public speaker.
24. Athletics interest me less than intellectual affairs.
25. Try to get my own way even if I have to fight for it.
26. Am able to play my best game or contest against an opponent who is greatly superior to me.
27. Would rather work for myself than carry out the program of a superior whom I respect.
28. Have tried to argue or bluff my way past a guard or doorman.

29. Do not lack self-confidence.
30. Try to treat a domineering person the same as he treats me.

Miscellaneous behaviors

31. Prefer to associate with people who are younger than I.

Here, the extremes of the ratio, D/σ^D, are 6.34 and 3.04. On six items there is a difference in per cents of 20 points or more. The median value of reliability is 4.13. Thirty-one items meet the minimum criterion of significance, where the difference is three times its standard error; and 17 items have a difference quotient of 4 or higher.

In general make-up the self-appraisals of Jewish mothers reproduce the picture for their mates, though in a less pronounced degree. The sex difference is reasonable in that Jewish women are relatively sheltered from the social struggle. "Indifference to members of the opposite sex" is construed, as a trait of Jewish wives, to be symptomatic of family solidarity. It illustrates, perhaps, a magnification of closely-knit monogamous ties within a larger group that falls back on itself. The "preference for associating with people who are younger than I"—which has rather high critical value—is regarded as an incident of escape. It is logical that a brooding, defeatist, and highly motivated Jewish mother would live vicariously in her children or in what they imply. The mere history of a precarious, hard-won financial rise, if such was the case, would tend to heighten the degree of identification with the young whose college careers, and other opportunities, constitute the fruits of the struggle.

The results on Jewish sons, which appear in Table III, are not directly comparable to those on Jewish fathers. The latter include not only the 56 fathers of the college men in question, but the fathers of 58 unrelated women Jews as well. Moreover, because of smaller numbers, the minimum ratio of reliability was set at 2.5 for Table III. The effect is to do justice to a larger range of differences, some of which are doubtful on grounds of reliability.

TABLE III

Introspections Which Distinguish Jewish Boys

(See Appendix I for the differences and their significance)

Gregariousness or social hunger

1. See more fun or humor in things when I am in a group than when I am alone.
2. Find conversation more helpful in formulating my ideas than reading.
3. My ambition needs occasional stimulation through contact with successful people.

Emotionality or instability

4. Experience many pleasant or unpleasant moods.
5. Worry over possible misfortunes.
6. Am slow in making decisions.
7. Find that I cannot make up my mind until the time for action has passed.

Humility and sensitiveness

8. Prefer to associate with people who are younger than myself.
9. Usually work better when I am praised.
10. Give money to beggars.
11. If I came late to a meeting I would rather stand than take a front seat.
12. Am much affected by the praise or blame of other people.
13. It bothers me to have people watch me at work even if I do it well.

Drive and aggressiveness

14. Do not keep in the background at social functions.
15. If I am spending the evening in the company of other people I do not usually let some one else decide upon the entertainment.
16. Would rather work for myself than carry out the program of a superior whom I respect.
17. Sometimes upbraid a workman who fails to have my work done on time.
18. Am considered to be critical of other people.
19. Have sometimes organized clubs, teams or other groups on my own initiative.
20. Do not find it difficult to speak in public.

Miscellaneous behaviors

21. Am not thrifty and careful about making loans.

Of the 21 items for which the difference is 2.5 times the standard error, 14 have ratios of 3 or above. An absolute

difference of per cents amounting to 20 or more points occurs on nine items. The median ratio is 3.44. The extremities of the range are 5.26 and 2.55.

Because of inadequate controls, no exact inference may be drawn as to age differences. Nevertheless, in broad outline the "Jewish complex," or whatever one chooses to call these data collectively, is not effaced among young Jews of college age who are largely first-generation American-born stock, in spite of the fact that numerous social disadvantages have been mitigated in their immediate history—factors like national origin in southeastern Europe, language handicap, and other distinguishing particulars like typical trades and a unique religion. One would gather that the lines of racial demarcation are drawn as tightly today as they were a generation ago—probably even more so, to be able to discount the relative gains of (these) younger American Jews. Increased racial separatism, if a fact, may owe its appearance to the concentration of Jewish population in great urban centers, or to the freezing of economic caste lines generally and the corollary of a susceptibility to racial rationalization in a predatory society.

One self-estimate of Jewish boys is double-edged and, hence, tentatively placed. Apparently, their "ambition needs occasional stimulation through contact with successful people." Though viewed as a symptom of Jewish social dependence, the item is equally in line with a perfectionist trend, depending on which ingredient one wishes to weight, the social dependence or the more intense motivation.

The ratings of Jewish and non-Jewish girls are considered next in Table IV. See footnote 3 for the details of sampling.

TABLE IV

Introspections Which Distinguish Jewish Girls

(See Appendix I for the differences and their significance.)

Gregariousness or social hunger

1. Feel that marriage is essential to my present or future happiness.
2. Would dislike any work which might take me into isolation for a few years, such as forest ranging, etc.
3. Often experience periods of loneliness.

Emotionality or instability

4. Some particularly useless thought keeps coming into my head to bother me.
5. Ideas often run through my head so I cannot sleep.
6. My interests change rapidly.
7. Am often in a state of excitement.
8. Often find that I cannot make up my mind until the time for action has passed.

Humility and sensitiveness

9. Give money to beggars.
10. Am touchy on various subjects.
11. Very much mind taking back articles that I have purchased at stores.
12. Am inclined to study the motives of other people carefully.

Drive and aggressiveness

13. If I am spending an evening in the company of other people I usually do not let some one else decide upon the entertainment.

Miscellaneous behaviors

14. Am not usually considered to be indifferent to the opposite sex.
15. Am not thrifty and careful about making loans.

Fifteen items satisfy a ratio of 2.5 or better; and eight items, a ratio of 3 or higher. The median value is 3.65, taking the list as it stands. A raw difference of 20 or more in per cents occurs on eight items.

There is further slight evidence of a sex difference, again pointing to a feminine advantage in the struggle for racial adjustment. Another marital attitude distinguishes Jewish women, the item, "I feel that marriage is essential to my present or future happiness." The opinion may designate feminine drive. More likely it denotes the fact that economic selection is more severe for Jewish women who suffer a double liability, so to speak, and recourse to marriage is a career in keeping with a time-honored Jewish tradition, and an emotional defense of sorts. In the latter sense this trait is a token of the desire for social security to be gratified, most probably, within a Jewish *milieu*.

A PSYCHOGENIC THEORY OF GROUP NEUROSIS

There seems to be a crystallized pattern of racial temperament to account for. Paralleling these items of self-report are a mass of Jewish adaptations already a matter of record and literary insight. The introspections and the behaviors piece together logically. A note on etiology is not beside the point, admittedly speculative though it be.

The collective maladjustment of American Jews brings to mind as a generalization a striking analogy from the clinical records of *family psychology*. Presumably "Jewish" traits resemble point-for-point the development of the child who is chronically thwarted by domineering and autocratic parents. The child's behavior-problem is classic; indwelling, introvertive escape is one turn; over-reaction and counter-attack is another. Nervousness and anxiety states are common in personalities evolving or revolting in a family background of this sort; and equally commonplace are the multifarious gestures for attention, often grotesque and circuitous. The analogy fits the Jewish situation perfectly, though it may not exhaust the problem.

Racial conflict is probably the key to Jewish personality. Quite apart from the direct pressures of contemporary prejudice, some psychological weight must be assigned to the cumulative force of the mere concept of Jewish exclusion. Sporadic anti-Semitism has thrived for at least 2000 years, creating the fact or illusion that the Jew is a marked man—an attitude, incidentally, which is espoused by many sophisticated Jews who view the Semitic question fatalistically as insoluble. Several opinion studies have recently documented a decided Jewish-aversion in America. An impressive account of race prejudice is recorded in *Christians Only* by Heywood Broun and George Britt. The Nordic Myth and its tragic consequences in one major state are universally known. Very possibly most or all of what is called the Jewish temper may be written off, etiologically, as adverse social conditioning.

A genetic difference may underlie Jewish psychology not-

withstanding the plausible psychogenic thesis. Obviously a majority of the nature—or instinctivist—arguments may be dismissed as rationalizations or misapplications of the criterion of universality. Among scientists, and more particularly among biologists, there is a far more serious indulgence, namely, the frequent rubber-stamping of racial attributes on the ground of undefined analogies and selection. The case for a genetic explanation of racial psychology is an experimental problem, the solution to which awaits the perfection of superior measures of behavior and, primarily, a marked advance in physiology. Until such a program is developed and integrated with human genetics, the sociologist's word on racial psychology would seem to be more significant. In the meantime, Jennings' advice to nature-nurture controversialists is the last word: the more we equate euthenic factors for various social groups, the more reasonable our hunch becomes that this or that psychological departure is inherent in the organism. Even granting an undefined "predisposition" towards Jewish imbalance, the *content* or *direction* of the racial neurosis, if such it be, remains to be explained. In this sense the patterns of Jewish temperament are definitely social and psychological. Their molds are sociologically framed by group interaction.

As a matter of custom and folkways, Jewish "maladjustment" is never solely the product of non-Jewish rejection. Minority group adaptations, originating as results of special treatment, in turn become causes of further conflict. For example, the proclivities which are commonly labeled as Jewish are seized upon by dominant culture groups to rationalize their intolerance. The process is circular, a matter of interaction continuous in the social heritage. Re-education in racial hygiene, therefore, applies to both dominant and oppressed groups. And racial issues ordinarily involve the whole social setting, *e.g.*, where a minority folk are exploited for purely economic or political ends. From the standpoint of social control the problem of race justice is co-extensive with all the major problems of sociology and political economy.

CONCLUSIONS

1. The data consist of Bernreuter self-ratings on 114 Jewish families and 113 non-Jewish families. Each family unit is a triad of father-mother-and son-or-daughter. Several factors were controlled in advance of race comparison: age, mental level, social class, residence, and approximate rapport.

2. The Bernreuter responses are analyzed item-by-item within each of the four age and sex groups.

3. Four distinguishing patterns characterize the Jewish introspections: (a) gregariousness or strong social dependence, (b) submissiveness, (c) drive and over-reaction, and (d) various anxiety states and symptoms of mood-change.

4. Social conditioning is regarded as the key to Jewish personality. An adverse social background is a matter of common knowledge, psychogenic factors indubitably explain the content and direction of Jewish adjustment, and the group neurosis has a neat analogy in the clinical picture of children long submitted to severe and repressive discipline.

5. The findings are stitched together by the concept of the inferiority complex and race conflict, the latter maintained by the oppression of dominant cultures and the reciprocal behaviors of the minority group. Still more basic is the whole fabric of social and economic determinism, and the extent to which the social sciences have affected social policy.

6. Genetic factors may contribute to Jewish imbalance. The question is premature considering the present state of human genetics and psychobiology. Moreover, the possibility is irrelevant in so far as it bears on the ethics of race persecution. The current attitude towards racial psychology is best labeled as biological mysticism.

APPENDIX I

The differences and the significance of the differences for Table I, II, III, and IV. The figures on a given item are listed in this order:

(a) the per cent of Jewish responses,
(b) the per cent of non-Jewish responses,
(c) D/σ D.

Jewish fathers, Table I

1.	49	27	5.15
2.	37	17	5.13
3.	75	55	4.87
4.	56	36	4.54
5.	29	14	4.12
6.	75	58	4.06
7.	39	23	3.90
8.	36	21	3.73
9.	60	45	3.37
10.	32	19	3.35
11.	23	12	3.24
12.	52	21	7.60
13.	68	43	5.76
14.	20	5	5.15
15.	18	8	5.08
16.	51	30	4.85
17.	34	16	4.71
18.	41	23	4.36
19.	27	12	4.26
20.	65	48	3.86
21.	25	12	3.76
22.	30	16	3.73
23.	24	13	3.18
24.	39	15	6.23
25.	96	78	6.12
26.	43	19	5.96
27.	38	16	5.67
28.	47	27	4.68
29.	68	48	4.60
30.	77	58	4.59
31.	31	18	3.39
32.	61	47	3.71
33.	32	18	3.64
34.	40	26	3.36
35.	80	67	3.30
36.	78	65	3.23
37.	24	13	3.18
38.	52	38	3.15
39.	31	17	3.68
40.	29	16	3.49

Jewish mothers, Table II

1.	54	27	6.34
2.	39	19	5.01
3.	58	39	4.42
4.	75	58	4.06
5.	61	44	3.84
6.	36	22	3.46
7.	65	51	3.18
8.	80	68	3.06
9.	72	50	5.13
10.	58	38	4.54
11.	36	19	4.29
12.	74	58	3.79
13.	69	54	3.46
14.	66	44	5.02
15.	63	42	4.77
16.	89	73	4.60
17.	96	81	5.34
18.	54	35	4.32
19.	55	36	4.31
20.	69	52	3.91
21.	33	20	3.31
22.	71	58	3.04
23.	17	3	5.30
24.	91	76	4.56
25.	53	34	4.33
26.	50	33	3.89
27.	68	52	3.68
28.	18	8	3.32
29.	66	52	3.19
30.	41	28	3.06
31.	50	32	4.13

APPENDIX I (*Cont.*)

Jewish boys, Table III				*Jewish girls, Table IV*			
1.	63	39	3.86	1.	72	44	4.70
2.	66	50	2.57	2.	67	51	2.61
3.	64	48	2.55	3.	60	44	2.57
4.	63	36	4.38	4.	48	21	4.70
5.	47	23	4.07	5.	55	30	4.14
6.	68	52	4.07	6.	41	19	3.91
7.	39	20	3.33	7.	43	26	2.89
				8.	45	28	2.85
8.	29	5	5.26				
9.	80	57	3.99	9.	95	63	6.76
10.	95	79	3.83	10.	62	28	5.78
11.	64	45	3.04	11.	76	51	4.25
12.	47	30	2.78	12.	71	49	3.65
13.	43	27	2.66				
				13.	40	23	2.96
14.	75	52	3.85				
15.	39	18	3.74	14.	85	70	2.90
16.	71	50	3.44	15.	40	24	2.76
17.	41	23	3.07				
18.	43	27	2.63				
19.	71	55	2.63				
20.	64	48	2.55				
21.	34	14	3.77				

HOMOGENEOUS GROUPING AS A MEANS OF IMPROVING THE PREDICTION OF ACADEMIC PERFORMANCE[1]

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IN AN earlier study[2] the best measure for predicting college success at the University of Buffalo was found to be the total weighted academic New York State Regents average.[3] The group studied were all entrants at this University for a six-year period, 750 students. Herein this total group has been subdivided into various more homogeneous populations—by sex, age at high school graduation, high school from which the student was graduated, amount of secondary school content repeated,[4] amount of foreign language spoken in the home, and position among siblings in the family. These more homogeneous groups have been studied for effects upon the relationship between two-year college average and total Regents average as well as for average and variability of performance at these two educational levels. Regression equations for the prediction of college success from high school

[1] This study was made possible through a grant from the General Education Board and is part of a larger study. Portions of the data herein presented were reported at the meeting of the American Psychological Association, September, 1934.

[2] M. E. Wagner. "Prediction of College Performance" from "Studies in Articulation of High School and College," *The University of Buffalo Studies*, 1934, 9, 125–173 and 184–209. The reader is referred to this study for a description of measures, subject group, and the like.

[3] A correlation coefficient of r .65 was obtained between this Regents average and the two-year freshman-sophomore college average.

[4] Sarbaugh, M. E. "Effects of Repetition of High School Courses on College Success," from "Studies in Articulation of High School and College," *The University of Buffalo Studies*, 1934, 9, 174–183. For this particular study the number of subjects was considerably less—about one-half the number used for the other comparisons.

performance have been calculated and graphs for these equations are herein presented.

In the earlier study,[5] with the same group of subjects used herein, the best multiple correlation coefficient obtained between our criterion of college success and any combination of measures was R.67 between this criterion and a combination of total Regents average and Iowa High School Content Examination. This multiple relationship could not be raised by the addition of age at high school graduation and American Council Psychological Examination scores. In a review of the literature,[6] two authors were found who reported multiple *R's* of .80 and over and two more between .70 and .80. The remaining studies showed R's of less than .70. These figures are given for comparison with those obtained between our single measure and the criterion for the various groups studied. Specifically the purpose of this research is a demonstration of a more reliable means of predicting academic performance (zero-order correlation coefficients for homogeneous subgroups) than the usual coefficients for complete populations or the more laborious multiple correlation coefficients.

Sex and Graduating School

Table I shows the relationship between high school and college success by sex and graduating high school. The total 750 student subjects were subdivided into constituent populations of 477 boys and 273 girls. Correlation coefficients, means, and standard deviations for both Regents and freshman-sophomore college averages were obtained for the two consequent scatters. Both the boy and girl groups were further subdivided according to school from which they were graduated and similar calculations performed for such populations.

Our first observation is the usual finding of investigators: the correspondence between academic measures is higher for girls (r .72) than for boys (r .58) or for the total group

[5] Wagner, M. E. *Op. cit.*, p. 136.

[6] *Op. cit.*, pp. 198–199.

TABLE I

Zero-Order r's, Means, and S.D.'s by Schools*

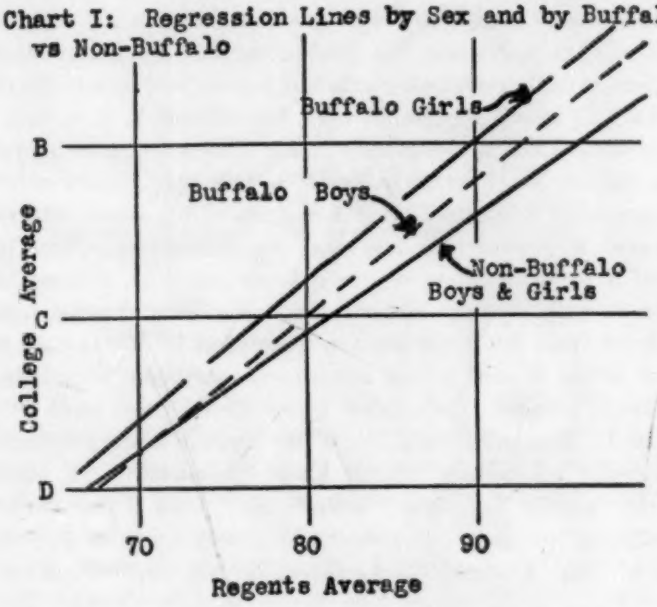
	BOYS						GIRLS					
	No.	r	Reg. Ave. Mean	Reg. Ave. S.D.	Coll. Ave. Mean	Coll. Ave. S.D.	No.	r	Reg. Ave. Mean	Reg. Ave. S.D.	Coll. Ave. Mean	Coll. Ave. S.D.
Bflo. School No. 1	68	.68	80.7	4.6	4.2	.77	53	.81	81.9	5.8	4.3	.73
No. 3	51	.45	79.6	4.8	4.0	.54	22	.57	84.8	6.1	4.5	.53
No. 4	88	.65	80.7	4.7	4.1	.70	37	.83	84.0	5.7	4.3	.69
No. 5	76	.63	79.8	4.8	3.9	.73	58	.70	82.3	5.9	4.2	.71
No. 6	25	.77	81.4	5.5	3.8	.68	25	.75	82.4	5.8	4.2	.68
Non-Bflo. City Schools	72	.49	79.1	4.5	3.8	.66	24	.58	81.9	5.4	4.0	.68
Buffalo Suburbs	26	.77	78.1	6.4	3.9	.67	22	.64	80.1	4.7	4.0	.55
Rural Villages	35	.37	77.5	4.1	3.9	.56	19	.42	79.4	5.2	4.1	.72
Total Buffalo Schools	338	.60	80.3	5.0	4.0	.70	207	.76	82.7	6.9	4.3	.70
Total non-Buffalo Schools	139	.52	78.5	4.9	3.8	.65	66	.55	80.7	5.2	4.1	.63
Grand Total	477	.58	79.7	5.1	4.0	.70	273	.72	82.4	5.8	4.2	.69

* Correlation coefficient between total "academic" Regents average and the freshman-sophomore college average.

(r .65). That is homogeneity by sex makes it easier to predict future performance by a measure of past success *for girls.* Also, it will be noted that the girls as a group at this University are slightly superior to boys at both levels of academic attainment.

Chart I shows the regression lines for all the Buffalo boys, for all the Buffalo girls, and for the total non-Buffalo entrants.

Chart I: Regression Lines by Sex and by Buffalo vs Non-Buffalo



Not only may we predict the college performance for a girl with somewhat less error, but from this chart it is evident that, with a given high school average, one should forecast a slightly higher college average for a girl than for a boy (ca. .2 of a letter-grade). Furthermore, Buffalo students regardless of sex are more predictable (r .60 and r .76 for boys and girls respectively) and make better college grades for a given Regents average than do non-Buffalo high school graduates (r .52 and r .66).

Further inspection of Table I shows that the high school

average predicts college performance in general more readily for students from the large Buffalo schools (among ten such relationships, there are two over *r* .80 and three of *r* .70 or more) than for those from non-Buffalo institutions.[7] In general, students from non-suburb small towns are least predictable[8] at this University (*r* .37 and *r* .42 for boys and girls); those from non-Buffalo cities[8] are next in difficulty of prediction (*r* .49 and *r* .58); while the girls from Buffalo Schools Nos. 1 and 4 are most predictable of all (*r* .81 and *r* .83). That is, holding the graduating school constant raises the prediction correlation coefficient for *certain school groups.*

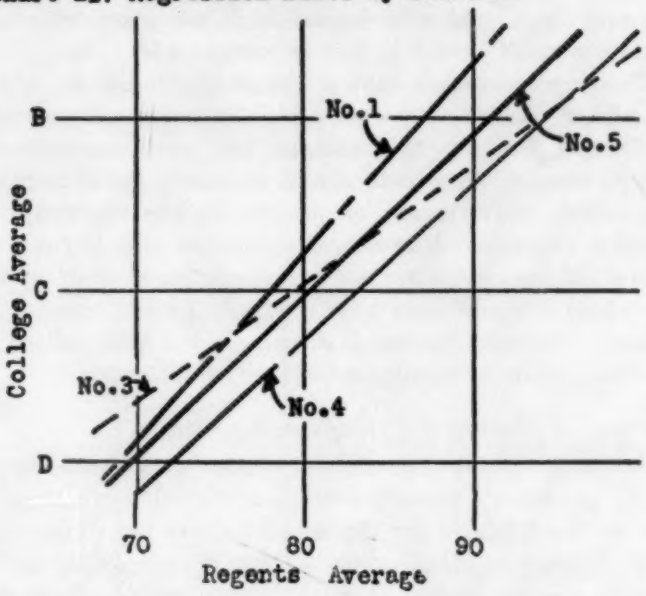
Chart II shows regression lines for Schools 1, 3, 4, and 5. From these lines it is obvious that a ninety Regents average from School No. 1 is likely to net a definitely higher college average than a similar grade from any other school charted. However, a student with a seventy Regents average from this school is quite likely to secure a lower mark in college than students with seventy Regents averages from other schools. Students from No. 4 are least successful at all levels. At the upper levels of high school attainment, students from School 4 average almost a full letter grade lower than those from School 1. Students from No. 4 are largely underprivileged, bi-lingual individuals whose home background is almost entirely within Buffalo's "interstitial"[9] area. The student population from No. 1 is almost completely a monoglot group with a "middle class" background, largely professional and

[7] Carson, F. H. *A Study of Some Factors Influencing the Academic Success of Freshmen Students during Their First Semester at the University of Pittsburgh.* M.A. Thesis, 1928. An r .78 is herein reported between the high school average and freshman college success for students from Pittsburgh high schools.

[8] Scates, D. E. *Selective Admission and Selective Retention of College Students at the University of Chicago.* Ph.D. Thesis, School of Education, University of Chicago, 1926. This investigator finds a definitely higher relationship for students coming from Chicago high schools than for those from all high schools attending his University.

[9] For a definition of this term see F. M. Thrasher, *The Gang; a Study of 1,313 Gangs in Chicago,* University of Chicago Press, Chicago, Ill., 1927.

Chart II: Regression Lines by Schools



business. No generalizations are at this time attempted concerning closeness of relationship and type of school population. The data in this paper are presented for their stimulus value in the hope that other investigators will publish concerning similar homogeneous groups.

The averages and standard deviations for the academic performances at high school and college were also calculated for the various school groups studied (see Table I). This was done to test the effect of level of performance upon prediction. The girls averaged higher in both high school and college than the boys, both *in toto* and for each school group. Groups of Buffalo girls averaged higher than those from non-Buffalo areas. The Buffalo boys, while having averages superior to non-Buffalo boys, were about equal in performance to non-Buffalo girls. The relationship between Regents and college averages for the schools was very close. That is, with one exception—the boys from School 6, the school group

having the highest Regents average also made the best showing in college, that with second high secondary school performance stood second in college success, and so on.

Those groups which have a high Regents average (except the girls from School 3) show a high relationship (correlation coefficient) between this average and freshman-sophomore college success. That is to say, it is usually easier to predict the college performance of groups having relatively high Regents averages. However, the converse is not true. Successful college groups are *not* necessarily made up of students for whom it would have been relatively easy to predict such success. Occasionally one is surprised by a good college performance made by mediocre high school students.

Amount of Regents Examination Repetition

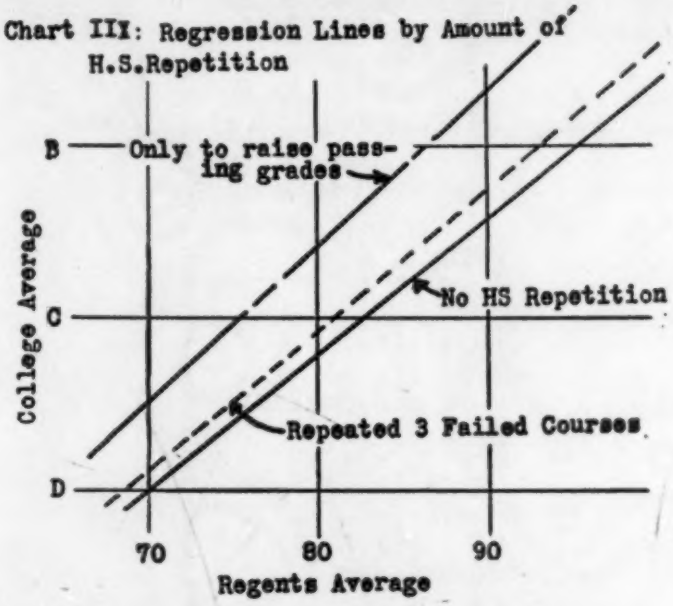
Sarbaugh[10] finds that the correlation coefficients between total "academic" Regents average and freshman college success are much higher for students who have not repeated any of their Regents examinations or who repeated only to raise already passing grades (for scholarship purposes) than for those who repeat previously failed courses in direct correspondence to the number of subjects failed. The r is especially high for those who repeat to raise grades, *i.e.*, those who are academically highly motivated. This is completely in accord with those[11] who expect high motivation to result in close relationship between the two levels of academic attainment. Here, as was found also with the other groups described above, those which have a high Regents average also show a closer relationship between this Regents average and

[10] *Op. cit.* This author reports r .71 for those repeating to raise passing grades; r .62 for those who do not repeat any examinations; and r .54, r .48, and r .35 for those repeating one, two, and three previously failed courses respectively. The Regents average and freshman-sophomore college average both decreased for the groups in the order listed above; those repeating to raise grades already passed have the highest average in both high school and college.

[11] Jones, E. S. "The Grade-Test Correlation as an Index of Motivation." *School and Society*, October, 1932.

the college average. That is, it is easier to predict college success for members of the groups which have a high secondary school record.

Chart III shows regression lines for those who repeated Regents examinations to raise grades, for those who did not



repeat any, and for those who repeated three or more previously failed examinations. It is evident that, for any Regents average, those who repeat to raise grades are definitely the better college risks. They are consistently, at all levels of Regents performance, one-half of a letter grade above the other charted groups. Those who repeat because of failure seem to be slightly more successful in college than those of the same high school performance who have not repeated any high school subject.

Amount of Foreign Language Spoken in the Home

Table II shows that all groups of bi-lingual girls have a higher correlation coefficient (*r*. 84) between the Regents and

TABLE II

Zero-Order r's, Means, and S.D.'s by Amount of Foreign Language Spoken in the Home*

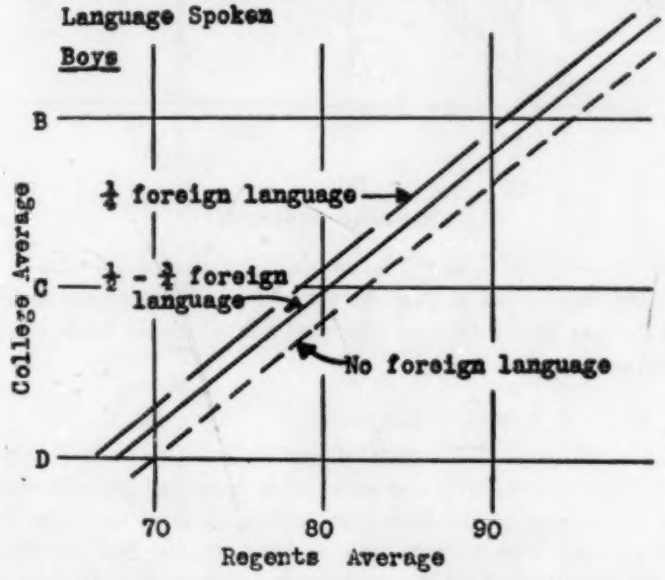
	BOYS						GIRLS					
	No.	r	Reg. Ave. Mean	Reg. Ave. S.D.	Coll. Ave. Mean	Coll. Ave. S.D.	No.	r	Reg. Ave. Mean	Reg. Ave. S.D.	Coll. Ave. Mean	Coll. Ave. S.D.
None	310	.60	79.7	5.1	3.9	.70	213	.69	82.5	5.9	4.2	.68
One-fourth	75	.60	80.0	5.4	4.1	.72	36	.83	82.4	6.0	4.3	.75
One-half and Over	55	.56	81.1	5.1	4.1	.72	22	.84	82.3	5.9	4.4	.67

* Between total "academic" Regents average and freshman-sophomore college average.

college averages than the much larger mono-lingual group. What little difference there is for the various groups of boys is in the direction of greater correspondence between our variables for the monoglots and for those who speak a minimum of another language. The bi-lingual girls, however, are superior only in college performance. Homogeneity of grouping improves the predictability of performance definitely for the bi-lingual girls.

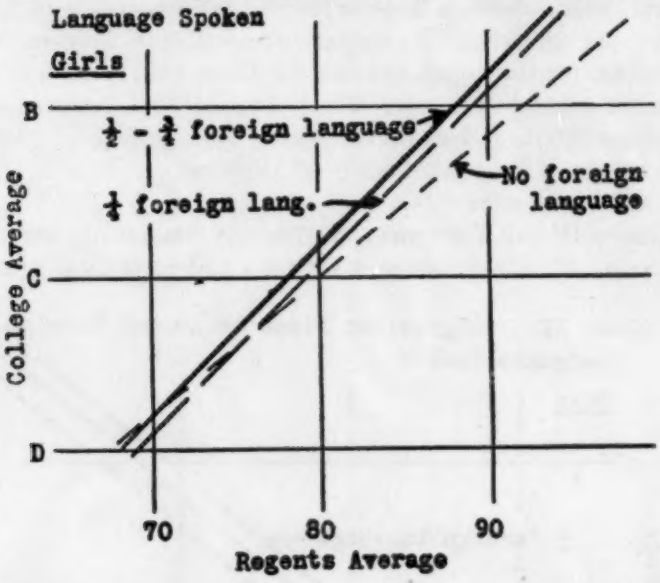
Charts IV and V graphically show the relationship between Regents and college averages for boys and girls according to

Chart IV: Regression Lines by Amount Foreign Language Spoken



the proportion of foreign language spoken in the home. The bi-linguals, especially at the upper levels of performance, earn better college averages than monoglots of the same Regents performance. This would seem to indicate that, if bi-lingualism is an academic handicap, it is less potent at the college level than for high school achievement. Again, it may well be that the bi-lingual groups are comparatively more moti-

Chart V: Regression Lines by Amount Foreign Language Spoken



vated in college. The guidance value of Charts IV and V is evident: bi-linguals may be expected to be more successful in college than mono-lingual students of the same high school performance.

Age at High School Graduation

Table III gives the correlation coefficients between Regents and college averages by age groups for boys and girls together with the means and standard deviations of these variables for each group. The correspondence between the two variables for the boys is highest for the sixteen year olds (r .72), next so for those twenty and over at secondary school completion (r .66), and lowest for those completing at the normal age of eighteen years (r .51). The seventeen and nineteen year old girls show the highest degree of relationship (r .79 and r .80 respectively), the sixteen year olds the least (r .59). Homogeneous grouping by age improves the predictability of boys sixteen and less and twenty and over, and for girls seventeen

TABLE III

Zero-Order r's, Means, and S.D.'s by Age at High School Graduation*

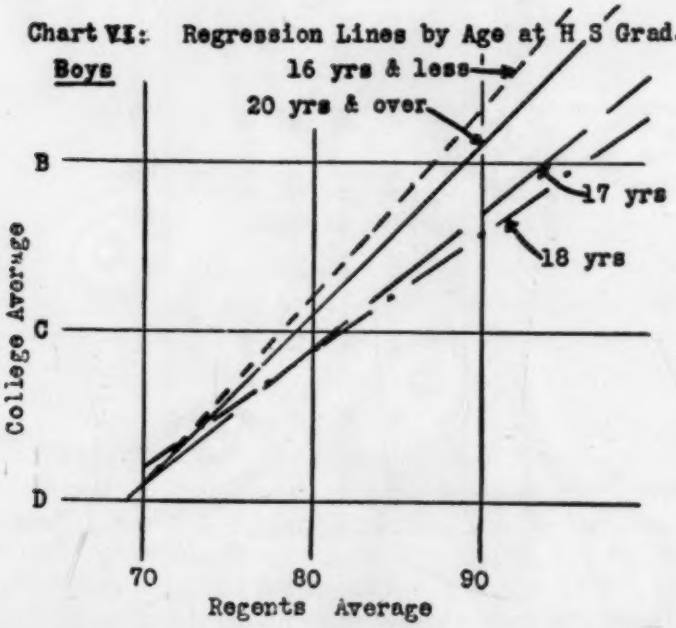
	BOYS						GIRLS					
	No.	r	Reg. Ave. Mean	Reg. Ave. S.D.	Coll. Ave. Mean	Coll. Ave. S.D.	No.	r	Reg. Ave. Mean	Reg. Ave. S.D.	Coll. Ave. Mean	Coll. Ave. S.D.
16 yrs. and less	48	.72	81.1	4.8	4.3	.71	48	.59	83.4	5.1	4.4	.56
17 yrs.	148	.59	80.9	5.0	4.0	.74	101	.79	83.5	5.7	4.3	.61
18 yrs.	177	.51	79.4	5.0	3.9	.65	87	.68	79.1	6.7	4.1	.69
19 yrs.	29	.57	76.7	4.7	3.7	.57	21	.80	77.5	5.7	3.7	.61
20 yrs. and over	71	.66	77.9	5.1	3.9	.75	5					

* Between total "academic" Regents average and freshman-sophomore college average.

and nineteen years of age at high school graduation over that for the total boys and girls respectively.

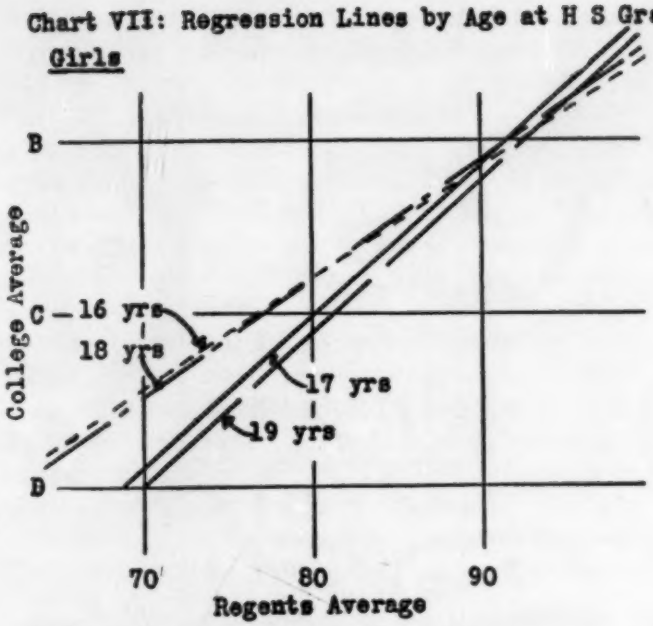
Guesses might be hazarded regarding the causal factors operating to make for or reduce correspondence between our variables for these age groups: possible lack of social adjustment of many of the sixteen year old girls; high motivation for boys of this age level; absence or variability of motivation and ability among the eighteen year old boys and girls. However, these are guesses, leads, possibly, to further research.

Charts VI and VII present the regression lines for the various age groups of boys and girls. The boys sixteen or less



at high school graduation and twenty and over, especially at the higher levels of high school attainment, are definitely better college risks for any given Regents average, than those completing high school at either seventeen or eighteen years of age. The regression lines fan about a Regents average of seventy-three or four. For the girls, differentiation of college

Chart VII: Regression Lines by Age at H S Grad.



success by Regents average for the various age groups is easier at the lower levels of attainment. A seventeen or nineteen year old high school girl graduate with a Regents average in the seventies is a poorer college risk than one of similar secondary achievement but completing at the age of sixteen or eighteen. However, the differences are not great and at this low level of attainment the number of cases are few. In fact, the picture for the girls is far from clear so far as age grouping is concerned. Lack of agreement between data for boys and girls seems largely concentrated within the sixteen year old populations. Further study of these groups might be very profitable.

Position among Siblings

Table IV gives the correlation coefficients, means, and standard deviations by position among siblings. For the 49 "only" girls, the relationship between high school and college

TABLE IV

Zero-Order r's, Means, and S.D.'s by Position Among Siblings

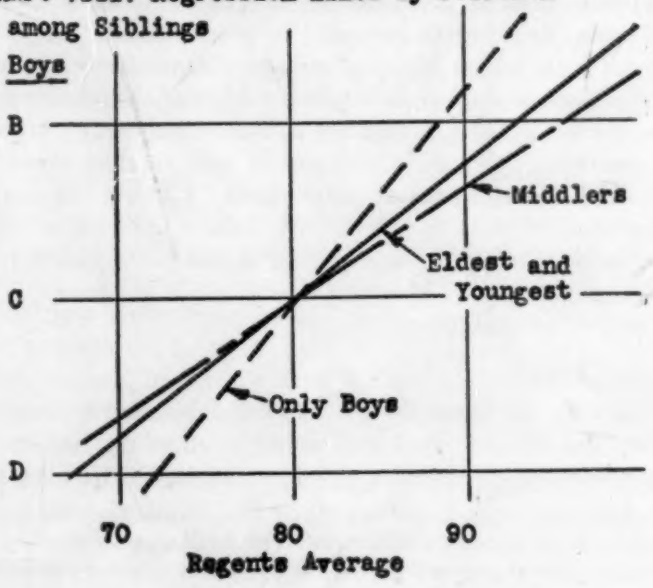
	BOYS						GIRLS					
	No.	r	Reg. Ave. Mean	Reg. Ave. S.D.	Coll. Ave. Mean	Coll. Ave. S.D.	No.	r	Reg. Ave. Mean	Reg. Ave. S.D.	Coll. Ave. Mean	Coll. Ave. S.D.
Oldest	127	.59	80.0	5.2	4.0	.68	76	.61	83.1	6.1	4.4	.81
Youngest	106	.64	79.7	5.4	4.0	.63	42	.81	82.5	5.1	4.4	.52
Middlers	104	.44	79.5	4.7	4.0	.68	54	.59	82.1	7.0	4.2	.66
Only	80	.80	80.6	5.3	4.0	.68	49	.89	82.2	5.5	4.1	.82

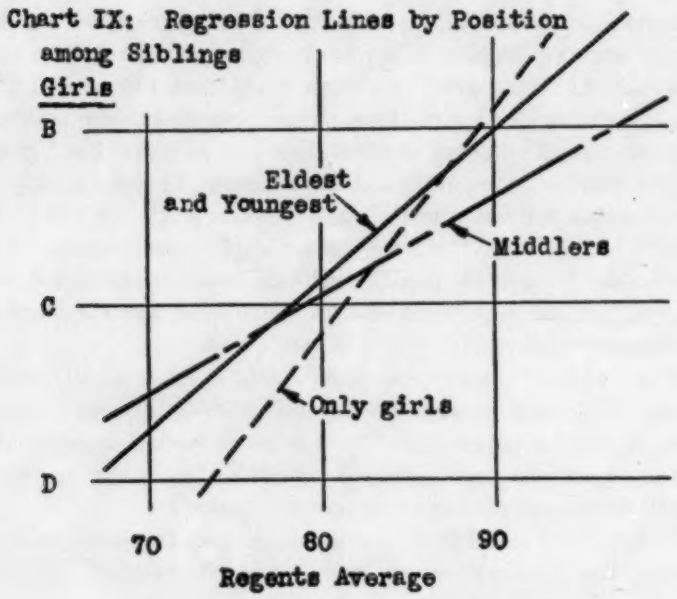
performance is r .89; for the 80 "only" boys the r is .80. These are the highest relationships obtained for either sex. For the 42 "youngest" girls an r .81 was obtained. The "middle" boys and girls show lower correspondence between the two variables being studied than any of the other "place in the family" groupings. For the boys the relationship is about equal for the "oldest" and "youngest;" for the girls, the "middlers" and "oldest" have r's very nearly equal. The 40 "older" girls in families of two were investigated for correspondence between measures. An r .68 was obtained as contrasted with r .61 for all "eldest" girls.

The "oldest" and "youngest" girls show a small superiority in college success over "middle" and "only" girls. Except for this superiority, there is no difference between the various positions among sibling groups so far as average high school or college performance is concerned.

Charts VIII and IX show regression lines for these groups. They pivot about a C college and 80 Regents average. Except

Chart VIII: Regression Lines by Position among Siblings





for differences in predictability, regression lines show little difference between the groups. To be certain, an "only" boy or girl with a high Regents average is more likely to have a high college average than members of any of the other groups; also low attainment in high school means for "only" students a greater likelihood of failure in college than would be expected for members of other family pattern populations. Furthermore, the "middlers" are slightly inferior in college success at the upper levels of high school performance to the remaining groups. However, the greatest difference is one of ease of predictability.

Degree Sought

Finally, our subjects were classified by degree sought to determine whether final goal would so effect motivation that the prediction coefficient would be changed.[12] For boys, how-

[12] The American Council Psychological Examination has been found to yield somewhat higher *r's* with the total freshman-sophomore college performance, with average college English, and with average college physical

ever, the differences in size of correlation seem in large measure attributable to differences in average ability (as measured by attainment at both educational levels). An r .27 was obtained between Regents average and college achievement for the 56 predental students; r .48 for the 69 prelegal students; r .55 for the premedics (131 cases); and r .61 for the 136 arts and science boys. The average Regents average for the various groups was lowest for the predents, highest for the arts and science students, and about equal for the prelaw and premedic groups. In the previous study[13] it was noted that it is easier to predict for students at the upper end of the distribution of high school attainment than at the lower end. It may be that this, in large part, explains the low relationship for the predents, as well as the comparatively high one for the arts and science group.

For the girls, the non-arts group (classified together because of small numbers) shows the higher correspondence; r .84 for 28 cases, as contrasted with r .69 for the total arts and science girls, this in spite of the fact that as a group they are slightly lower at both academic levels. The writers feel that this may well be due to greater motivation among such girls as have selected a definite profession where competition is keen and where the female of the species is not looked upon with special favor.

Summary and Conclusions

This study is exploratory rather than conclusive in nature. Its original purpose was a search for a more reliable means of predicting college success. A total student body was subdivided into more homogeneous groups and the correspondence between the criterion and the best predictive measure of such success, according to a previous study, was investigated for such subgroups. Such homogeneity of population provides an improved prediction *for certain groups*. Secondly,

science for the arts and science group than for non-arts students. From unpublished results on file in the offices of the Study of the Superior Student, the University of Buffalo, Buffalo, N. Y.

[13] Wagner, M. E. *Op. cit.*, p. 133.

individual differences in academic success for the various groups were investigated. Thirdly, differences in college performance as related to high school attainment were studied to see, for example, whether a boy graduated from a rural high school with a Regents average of ninety had as good a chance, a better, or a poorer one of making A grades in college than one from a Buffalo school. Fourthly, some attempt is made to understand the reasons for the greater predictiveness of certain groups and the relative lack of consistency of performance of others.

When a total student body is subdivided into more homogeneous groups, the following divisions are found to yield a closer correspondence between high school and college achievement than that for the total group: girls in general, Buffalo as contrasted with non-Buffalo students, certain particular schools as contrasted with others, those who repeat Regents examinations to compete for scholarships as contrasted with those who do not repeat or who repeat in order to pass, bi-lingual *versus* monoglot girls, "only" children, "youngest" children especially girls, boys whose goal is a B.A. or M.D. degree, pre-professional girls, boys completing high school at sixteen years of age or less and twenty years or over, and girls who complete high school at nineteen or over, or at seventeen years of age. However, for age and degree sought, the picture is not clearly drawn.

The following groups show a correspondence between our two variables of r .80 or over: all bi-lingual or "youngest," or pre-professional girls, girls from schools No. 1 and 4, and girls who completed high school at nineteen years or over, together with "only" children of both sexes. In addition, the following classifications show an r of .70 or over: girls as a total group or from all Buffalo schools as a group, as well as those completing high school at seventeen years of age; boys from No. 6, from Buffalo suburban high schools, and those graduating from high school at sixteen years of age or less. Groups showing especially low relationships are: total non-Buffalo schools, especially rural village and non-

Buffalo city secondary institutions, those who repeat examinations because of previous failure, all those who complete high school at eighteen years of age, all "middle" children, and predental boys.

Given a definite Regents average, by and large, a girl will achieve slightly more in college than a boy; a Buffalo student, slightly more than a non-Buffalo high school product; students from certain Buffalo schools, more than those from other schools; bi-linguals slightly more than monoglots; those who repeat Regents examinations in scholarship competition are more successful at every level of Regents performance than those who do not repeat; boys sixteen years or less and twenty years and over at high school completion and girls sixteen or less or eighteen years of age are more successful than those of the same Regents average and of another age at secondary school completion. Predental boys achieve less than those of the same high school success who seek other degrees. "Only" children with superior Regents averages are more successful in college than non-only boys and girls of the same secondary school achievement. However, with inferior Regents grades, the "only" child is less successful in college than "non-onlies" of the same high school performance.

The following factors seem to make for ease of prediction within groups studied: (1) a high average Regents average, (2) high motivation, and (3) relative homogeneity within subgroups. Examples of the first are (a) girls as contrasted with boys, (b) Buffalo schools as contrasted with non-Buffalo schools, (c) sixteen year old boy high school graduates and seventeen year old girl graduates, and (d) degree sought. As examples of relative homogeneity within the subgroups investigated, we may consider sixteen year old boys, who, as a group, must needs be bright and more motivated than average, as contrasted with those boys completing high school at eighteen, many of whom may be bright but lacking in motivation, or highly motivated and dull, or again atypical in neither ability nor motivation. Or again, the "only" child has a more constant sibling relation than a group of

"middlers," some of whom may be the middle of three, the second of ten, or the ninth of ten. The bi-lingual or pre-professional girl is probably more motivated than the average girl. The sixteen year old boy graduate is probably more motivated than those older, as too may well be those nineteen or twenty and over at secondary completion. Undoubtedly those competing for scholarships or for other reasons repeating a previously passed examination to raise its grade are highly motivated.

In concluding, the authors wish again to make the point that this investigation is in no wise final. It may well be that similar results would not be forthcoming at another institution. Except for homogeneous grouping by graduating school and sex, findings here reported are but suggestive. It is hoped that investigators at other institutions may report similar researches.

ELEMENTS OF ERROR IN TESTIMONY

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A RECENT adventure in making and assembling the abstracts of over two hundred controlled studies in recall accuracy suggested the desirability of an analysis drawn from experimental work. The merit of the following pages must rest for the most part on the value of the comparative approach.

THE CULTURAL DEFINITION IN TESTIMONY

The cultural pattern and its pervasive control of human value can be disregarded in testimony no more than in other lines of social phenomena and interaction. Social values determine facts quite as much as they are in turn determined by them. Probably no social group has the insight to differentiate between fact and current cultural fiction. This cultural *blind spot* which enables us to laugh at the crude definitions of alien and earlier cultures permits no such liberties toward our own. We become amused only when the definition has become archaic and when values have lost their classification among the mores. Thus the nature of today's testimony will not be altered at all by the criticism that what we have designated as improvement of our legal machinery is but the replacing the discredited generalizations of the eighteenth century with the somewhat more recent generalizations of the nineteenth (1). Testimony is neither an ultimate nor an independent source of knowledge (2).

Expressions of cultural bias and prejudice are always in order within one's own group. They are acceptable testimony. So long as the myth of the imaginary island of St. Brandan was general, the illusions of a mountainous isle were accepted for fact by the inhabitants of the Canaries (3). Thus G. Archdall Reid was led to comment that "a religious and

ethical system may conflict daily with common sense (that is, evidence) and yet persist for a hundred generations'' (4).

This testimonial bias appears not only in terms of the culture group but also in terms of the culture level occupied by the witness. The interest level may define for us our facts quite as successfully as the culture pattern. When this is true, evidence becomes ammunition in a struggle between opposing interests, sifted evidence is shelved in favor of that in tune with our prejudices, and opinions serve quite as well as facts (5; 6; 7). ''Testimony is primarily a function of the commands of the group, brought to bear on the person testifying'' (8).

ERROR PRODUCED BY STEREOTYPES

To the above influences must be added the group's misconceptions, which are often independent of any dominant prejudice. These stereotypes or ''pictures in our head,'' as Lippman calls them, tend to replace certain variant aspects of experience with features or qualities more in keeping with a pattern which we have come to accept. We tend to recall and to testify not only that which we have seen or experienced, but that which we believe we ought to have experienced. Thus the stereotype becomes something of a generic picture which needs not conform to actuality. It often departs from the actual toward more ideal or base interpretations. The stereotype of criminal appearance but seldom finds expression among the convict group observed within prison walls, and that of fraternal love is often absent from associations within a lodge. He who describes the sunset of the previous evening without doubt more nearly approaches the hues and the cloud effects of his stereotype sunset than those which characterized the one he saw. Kuizema concludes, ''The eye can only see what it brings with it; the power of seeing. In the appercipient mass of perceived facts and knowledge there will be rivalry among the presentations and interests of the mind, or there will be cooperation according as new presentations do or do not coincide with the conceptions in the mind already there'' (9).

Similarly, recall brings greater symmetry or completeness

than that which was actually observed (10). The students in Professor Otto's experiment (11) added what was necessary from their stereotype of physical encounter to present a completed and logical report of the incident. According to Otto our position comes to this, "We learn what happened by ruling out unreliable testimony; and we learn what testimony to rule out as unreliable by learning what happened." Since the observer demands consistency in the items which he reports, he injects or rejects items to attain this consistency. Within the memory acts must harmonize with those which precede or follow them.

When a widespread stereotype conflicts with actuality, accepted facts are independent of reality. A religious or ethical bias supported by the press, the schools, and the church cannot be ignored by the law. Thus evidence may be admitted regarding things which have no real existence. The nature of the Devil or the influence of witches remain acceptable testimony as long as these biases persist and are widespread (4). This sympathetic determination of stereotypes enables us to explain the atrocities of Poland while we denounce similar activity in Petrograd (6). It also accounts for the fact that sensations of color, scent, and taste may be observed when these stimuli are not present (12). An incident (13; 14) staged before two classes illustrates well the influence of stereotype. In the interrogatory report many recalled not that which they had seen but that which is logical in a conflict situation. In spite of the fact that W's hair was well combed and that his face was heavily powdered, 21 of the 51 subjects reported a flushed face, and 10 disheveled hair. Fourteen declared that names were called, and but one-seventh recalled correctly the nature of the physical encounter. Contrary to his classroom custom, the instructor had worn glasses during the incident but removed them just prior to the reports. Nearly two-thirds recalled no glasses worn. The traditional stereotype relative to women also found its expression. In all seriousness over half declared that Miss C did the most talking, although W's conversation had exceeded hers by 50 per

cent. The same reasoning probably accounts for the fact that over four-fifths declared that she said the last word. Nearly two-thirds substituted the disputed white paper-covered book for the blue one actually taken from the room. A later study (15), as well as the experiment before the Congress of Psychologists reported by Van Gennet, tends to substantiate the universality of these phenomena (16).

SUGGESTION WITHIN THE COURT ROOM

Immediate and temporary suggestions are often quite as effective in influencing testimony as are those more permanent in nature discussed above. There is this exception, however. In the court room the error introduced by leading questions from one side may often be counteracted by similar action on the part of the opposition. When a widespread stereotype or cultural prejudice dictates the error, the other side is not present to offer its case, or, being present, is "laughed out of court." The judicial attempt to negate the influence of suggestion by no means eliminates the element of error thus introduced. The very nature of the question may predict the caution or error appearing in the answer (17). Asking the witness, "Didn't the wrecked car skid before it stopped?" tends to decrease the caution of the one testifying. Any question asking for personal opinion or estimate is found to greatly increase the suggestibility, but in such case it tends also to increase caution. "Was the man in the car Johnson or Brown?" contains much less suggestibility than "Was the man in the car Johnson?" (18). Morgan (19), in questioning 150 students regarding a recent intruder, discovered that the questions, "Do you think he was very tall?" or "How tall was he?" increased the answers in terms of tallness. "Was the suit black or brown?" accomplished a similar result for these colors, while 18 per cent provided the visitor with a buttonhole flower after this item was suggested in a question. Only 24 per cent had the courage to overcome the suggestion, "Why didn't he look at the class?" The accuracy on such cross-examination Morgan found to range from 3 per cent to 95 per

cent, with about 40 per cent representing the average. When 3 out of 21 witnesses observe accurately the wearing of glasses, and but 4 of 28 the action of picking a book from the floor by one directly in their line of vision, what a preponderance of testimony may be massed by skillful questions to support action which never occurred. While no age group is immune to this influence, the resulting error is greatest among younger witnesses (17).

Likewise, girls were found to possess weaker suggestion resistance than boys (20). However, it may be questioned whether this distinction made by Munsterberg at the beginning of the century would apply with equal force today.

SUGGESTION OUTSIDE THE COURT ROOM

This element of suggestion may appear quite independent of the court examination. Among the outside agencies, the newspaper influence has long been recognized in the selection of jurors. This caution, though often abused, is not without basis. Data abstracted from Bird's (21) study with University of Minnesota students reveals that the reading of an erroneous press account of lecture material increased errors in conformity with the press account in 26 per cent of the qualitative answers and in 7 per cent and 21 per cent of the quantitative answers.[1]

The suggestion which leads to inaccurate testimony may be a part of the incident observed. In McKeever's (22) experiment the participants in a hold-up often indicated in their conversation behavior contrary to their staged action. Where this was the case, the reports tended to substitute the suggested action for the overt.

The offhand opinions of police officers or the confessions of the culprit may also furnish the substance from which develop numerous fictions in testimony. In this connection Professor

[1] Note: This statement may at first appear to be in conflict with the conclusion of Bird that errors are more numerous for quantitative than qualitative material. Bird's conclusion is drawn from an analysis of all errors whether or not they were in terms of the press account. The above statement is confined to errors of the latter type only.

Munsterberg (20) of Harvard cites his experience as a witness concerning the burglarious entry of his own house when he testified under oath that the burglars, who were two in number, had entered at night by a cellar window, had taken such and such clothing, had left drops of candle wax on the second floor, and on the dining-room table a large mantle clock packed in wrapping paper which they had not taken. Later he found all of these statements to be in error. Hasty observation was partly responsible. Statements of others accounted for the remainder. That the entrance was made through the cellar window had been first suggested to the police and was accepted without verification, while the testimony regarding two burglars was unsupported by any evidence except the statement of the apprehended one. Professor Munsterberg concludes, "In spite of my best intentions, in spite of good memory and calm mood, a whole series of confusions, of illusions, of forgetting, or wrong conclusions, and of yielding to suggestions were mingled with what I had to report under oath, and my only consolation is that in a thousand courts at a thousand places all over the world, witnesses every day affirm by oath in just the same way much worse mixtures of truth and untruth, combinations of memory and of illusions, of knowledge and of suggestion, of experience and wrong conclusions."

CONDITIONS OF OBSERVATION

No evaluation of testimony can be made without some knowledge of the conditions of observation surrounding the event or item reported. The weighting of evidence within the court gives recognition to this fact, and it is not likely that controlled studies have added materially to judicial knowledge in finding that the accuracy of testimony is dependent upon the accuracy and completeness of observation (18).

DEGREES OF ATTENTION

The attention span of subjects which for simple word, letter, and number lists has been found to average but five items (23) without doubt becomes less where the items to be observed are

more heterogeneous in nature and distributed over a wider area. Under such conditions, especially in action experiments, much escapes conscious attention (16; 11; 13; 14). While M and W staged a scuffle and encounter, Miss C, who stood in the line of vision between the students and two combatants, stooped, picked up the disputed book, and placed it on the table. But four of the twenty-eight subjects recalled this action on her part, and nine failed to recall the fact that she later waved a book in the air and carried it from the room (13).

From this experiment and from others to be cited it appears that the subject gives conscious attention to items which seem to give meaning to the incident. Those actions which appear to have but incidental relationship or which do not help to interpret the situation are given careless attention. In another experiment, while all had observed the intruder remove the handkerchiefs from the gun, only 11 of the 21 could recall correctly that as the intruder started to leave he turned back, picked the handkerchiefs from the desk, and put them in his coat pocket. This was at a time when M had the gun in his own possession and attention was without doubt somewhat diverted from the intruder. Quite in contrast, all knew that M retained possession of the gun (15).

Among the many experiments that of Smith (18) was especially well planned to indicate the limited range of observation. He asked his subjects to observe squares pasted on a large cardboard for the purpose of making an estimate as to their number. During the observation period the experimenter, in plain view of his subjects, arose, left the rostrum, walked to the end of the platform, picked up a book, and groped aimlessly and awkwardly at the end of the platform, after which he walked back to his seat and concluded the experiment. After making estimates and resuming classwork for one-half hour, the subjects were questioned as to the experimenter's activity during the time that attention was directed to the squares. Thirty-five per cent of the police lieutenants, 65 per cent of the detectives, and 50 per cent of the states' attorneys had failed to

observe any of the movements of the experimenter, although he was at all times within their range of vision.

Attention with intention to remember has been shown by both Mulhall (24) and Achilles (25) to be more efficient than incidental learning. The experiment by the latter indicates that incidental learning was but 81 per cent as efficient for syllables and but 57 per cent as efficient for names and associated photographs as intentional learning.

VISUAL *vs.* AUDITORY OBSERVATION

A number of studies support a superior recall for visually presented items over auditory reception. Keil (26), reporting his experiment with school and college students, found that the visual presentation of objects was superior for memory purposes to either the visual presentation or the verbal presentation of the name. After three-day intervals, the ratio of recall between words pronounced, words written, and objects presented was as 5 to 9 to 25. Munsterberg (27) in the same year supported Keil's conclusion except in the case where aural and visual presentations were combined. In such cases he held the aural excels the visual. He reported that *if two senses work upon the same task (single series) memory is improved, but when presented with different tasks simultaneously they hinder each other.* Kuhlmann (28) with but five subjects concluded that visual imagery, which was established first in from 76 per cent to 89 per cent of the items, usually precedes verbal imagery, which occurred first in but 7 per cent to 17 per cent of the subjects. Bennett (29), however, did not discover such unqualified superiority for the visual. With nine subjects auditory presentation gave better results for the immediate retention of prose and disconnected material, but the visual presentation slightly surpassed the aural for all mediate recall. Louttit (30), testing four racial groups in Hawaii, found that the visual span was superior to the auditory among all groups.

That visual recall lacks consistency for different objects and different conditions is suggested by the low correlations found

by McGeoch (31) between the abilities to recall items of events and to recall pictures and object cards. The limited aid of visual imagery in reproducing long series of digits as determined by Oberly (23) adds support to this view. One study (32) exists which indicates superiority for the aural contacts, and two others found auditory advantage within younger age groups (33) and for immediate recall of prose and disconnected material, respectively (29).

While a greater number of studies point to better recall of visual observations than auditory, the exceptions are numerous enough to indicate that individual cases cannot be predicted on the basis of these results. It is quite safe to say that the laboratory contributions today provide no principle for judicial procedure concerning evaluation of auditory and visual observations. It should be kept in mind that although visual recall has in general been found more efficient than auditory, this advantage is usually minor and not major. A much more satisfactory approach and one that is possible is the determination of visual and auditory types. A sufficient number of studies is now available in psychological literature to indicate that such types exist, and the tests for determining the types are relatively simple. The testimony of a witness which may be most accurate for conversation may be highly inaccurate for written material (34). The reverse is equally true. Downey (35) also found that a subject with unusual memory for one type of visual presentation may recall with very ordinary ability when the material is presented in discrete instead of group presentations.

DISTRACTION

In view of the limitations in observation which we have already noted one might conclude that the injection of any distractive influences during the observation period would naturally reduce the efficiency of memory. Many studies do not support this conclusion. In fact, several indicate no greater decline in recall ability for periods when distraction is present than when it is absent. A review of the studies germane to

this point suggests the following conclusion: *to the extent that the distraction is unusual, occasional, or competes for attention within the receptive agency, both observation and resulting recall are impaired; conversely, to the extent that distraction is continuous, usual, or does not require conscious attention observation and recall are uninfluenced.*

W. G. Smith (36) in an early experiment employed the following distractions: the performance of simple additions, the repetition of a syllable, the tapping of a forefinger, and the beat of a metronome. The study indicates that muscular movements produce much less interference with memory than does activity of the vocal mechanism and that the auditory exposure from the metronome is least disturbing. On the basis of 36 points, the following memory scores were registered for each distraction:

Metronome	21.2
Tapping forefinger with metronome	18.5
Repeating the syllable "la"	16.3
Performing addition	12.9

From this it follows that mental activity apparently interferes most with recall when in competition with learning, that muscular movements are less disturbing, while stimuli from outside the body may be quite successfully ignored. The conclusion reached by Burtt (37) would support this view. Working with 11 subjects, he found no evidence to suggest that the distribution of attention or the presence of kinesthetic factors in any way impaired the clearness or persistence of images. Morgan (38) tested the effect of sound distraction upon memory by presenting paired associates under strain and noise and under quiet conditions. The number of correct immediate responses was somewhat less in case of noise, but this variation decreased with the second exposure. Eighteen of twenty subjects evidenced higher accuracy under conditions of quiet on the first exposure, while but thirteen were so affected for the second exposure. Further, the subjects evidenced the tendency to speed up their time reaction under noise. Morgan concludes, "The amount of material retained after two days

is less for material learned in noisy conditions than for that learned in quiet." That the type of observation determines the distractions which are effective is suggested by a comparison of studies reported above with that by Angell (39), who found that such distractions as counting the metronome beats or reading backwards did not interfere with tone identification.

When White (40) exposed 30 subjects to electric shocks between learning and recall he discovered that this interpolated distraction apparently influenced average memory to a very slight degree. Thirteen of his subjects improved their recall under such stimulation, while fifteen evidenced an opposite tendency.

COMPLEXITY OF ITEMS OBSERVED

The attention which the witness is able to command is in turn dependent upon the complexity of the incident observed. Increase in the items or relationships presented tends to decrease accuracy of recognition but at a somewhat slower rate than the corresponding increase (41). Droba (42) found that adding to the detail in the description of pictures reduced memory efficiency for the pictures themselves. Quite in contrast is the finding of McGeoch and Melton (43), who indicated that retention of nonsense syllables increased with the difficulty of the problem. Since the degree of complexity is dependent upon the length of the observation period, any increase in the period of observation tends to increase also accuracy of recall (44; 45; 46), especially for those mentally slow. The limits for the learning and the recall of complex incidents and series are soon reached. Oberly (23) determined this for series of digits. He discovered that the recall of numbers of more than five digits is made possible not by a single image but by a grouping of images, since the attention span limen, which he found to range from 2.5 to 8, does not usually embrace more than five items. This is significant in the recall of license numbers, and licensing bureaus might well give attention to the effect of number groupings upon retention. In fact, worth-while studies might be made of the recall

of license numbers according to the Iowa plan of county designations for comparison with the results where no groupings are provided. That the element of complexity may be reduced by graphic aids such as color and size was shown by Van Buskirk's study (47). This experimenter found vivid presentations to have memory persistence for difficult material.

Location near to the scene of action by no means guarantees that important items have been observed and retained. In fact, it is sometimes the more distant observer whose observation is most accurate (14). Emory Smith (18), in testing six subjects chosen from 350 eye-witnesses to a staged melee, found that those closest to the action of the experiment proved to be the poorest witnesses, and that one far removed gave the most accurate account. The high school teacher whose seat was located in the area of action and whose feet were trampled upon by a six-foot police officer declared that no officer was present during the encounter. Sir Walter Raleigh's concern over the discrepancy between the accounts given by the spectators relating to the affray outside the tower is duplicated in practically every experiment and in practically every episode. Shakespeare's comment, "Let every eye negotiate for itself and trust no agent" reveals that this phenomenon was not unknown to the master of letters.

PARTICIPATION BY WITNESS

While proximity to the incident and even participation in it may reduce accuracy for complicated or emotion-producing action (18), kinesthetic response usually aids instead of deterring accurate recall. Engaging in symbolic or identical expression of the object or incident observed brings a corresponding improvement in the resulting memory. Mainwaring's (48) conclusion that the association of kinesthetic experience is necessary in the recall of musical selections would support the findings of Moore and Mather (49), who found much higher recall for songs associated with singing, playing, or dancing. Similarly, Smith (18) found improvement of from 15–20 per cent when ideas were accompanied by expression.

Active participation in the organization of the observed material likewise assists retention. Here Maso's (50) experiment is of interest. Subjects who were required to classify the names of twelve pictures had a recall average superior to those presented with a previously classified list. Similarly, the biographies to be summarized and the code to be applied stimulated an average retention superior to that for biographies already summarized and codes already developed. Since this was true for but 65 per cent of the subjects, the conclusion relative to the advantage of participation cannot be applied to all witnesses.

SUMMARY

While no thoroughgoing treatment of observation as such has been attempted, the conditions of exposure experienced by the witness cannot be ignored in the evaluation of testimony.

That the presence of suggestion, whether inside or outside the court room, tends to increase error must be qualified by the factor of age and the capacity for critical observation.

Accuracy and completeness vary for visual and auditory contacts. Visual contacts are usually superior but this does not hold true for all subjects and objects of recall.

Distraction and complexity tend to produce error to the extent that they are unusual, occasional, or compete for attention within the receptive agency.

Nearness to the scene of action or emotionalized participation may produce inferior recall; rational participation usually aids retention.

The milieu of cultural values and predominating stereotypes must ever be recognized as a source of error. By their very nature, such errors are most insidious and most difficult to control.

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IS A TEST OF VISUAL MEMORY AFFECTED BY MATURITY?

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IT is a well-known fact that success on many psychological tests varies directly with the mental age of the subject. It is also known that on tests which may be affected by life experience, such as mechanical assembling tests, an older child will succeed better than a younger child, their mental ages being equal.[1] However, norms based on mental age where the subjects are subnormal are generally considered just as reliable as those based on chronological age where the subjects are normal.

The purpose of this study was to see what variation, if any, occurred in the test scores made by two groups of children one normal and the other subnormal, their mental ages being equal. The Ellis Memory for Objects Test[2] which is attractive to both younger and older children was selected for the study. It consists of ten one-inch metal toy objects:—a hat, car, dog, shoe, rider, gun, chair, axe, cup and hen. First the child names the objects as they are presented to him one at a time. He then names them again, noting the exact order. Finally, when the objects have been removed he tells which came first, second and so on.

There were 150 normal six year old children and 100 subnormal children with a mental age of six years included in the study. The normal children were in the first grade at Public School 208, Brooklyn, New York. The subnormal children

[1] Edna Willis McElwee. "Standardization of the Stenquist Mechanical Assembling Test Series III." *Journal of Educational Psychology*, Sept., 1932, Vol. 23, No. 6.

[2] Edna Willis McElwee. "Further Standardization of the Ellis Memory for Objects Test." *Journal of Applied Psychology*, Feb., 1933. Vol. 17, No. 1.

were candidates for the ungraded classes in the public schools of New York City. The chronological ages of the latter group ranged from eight to fifteen years with a median of ten years; their IQ's on the Stanford-Binet Examination ranged from 43 to 87 with a median IQ of 65.

TABLE I

Frequency Distribution and Percentage of Scores Made by 150 Normal and 100 Subnormal Children on the Ellis Memory for Objects Test

SCORE	NORMAL		SUBNORMAL	
	Number	Per cent	Number	Per cent
10–19	3	2.0	0	0.0
20–29	4	2.7	2	2.0
30–39	23	15.3	3	3.0
40–49	33	22.0	22	22.0
50–59	46	30.7	20	20.0
60–69	21	14.0	20	20.0
70–79	17	11.3	23	23.0
80–89	3	2.0	9	9.0
90–99	0	0.0	1	1.0
Total	150	100.0	100	100.0

Table I shows the frequency distribution and also the percentage of scores on the Ellis Memory for Objects Test made by both the normal and subnormal children. The median score of the normal children was 53, while that of the subnormal group was 61. There is an interesting difference between the two distributions. That of the normal children has a decided mode at the interval 50–59. In the case of the subnormal group there is no mode, the number of scores at each of the four intervals 40–49, 50–59, 60–69 and 70–79 being approximately one-fifth of the entire group. The standard deviation in actual units of the distribution for the normal children was $14.27 \pm .55$ and that for the subnormal children $14.87 \pm .70$. As both distributions are valid, there was a real difference in the chances for success of the two groups measured on the test of visual memory.

The term maturity in this article is used to refer only to physical maturity or chronological age. Many investigators have found that age is a factor in the development of rote memory in the years before adolescence, with a period of maximal efficiency at about fourteen years.[3]

Possible explanations for the higher scores made by the subnormal group on the test of visual memory are:

(1) As there is a gradual gain in rote memory up to the period of adolescence, the subnormal group had a distinct advantage in this respect over the first grade children. The latter were all six years of age, while the median of the subnormal group was ten years and in addition the chronological age range extended to fifteen years.

(2) Mentally retarded children often excel by comparison with normal children of the same mental age on the tests of memory in the Stanford-Binet Examination, such as repeating syllables and digits or reproducing the designs.

(3) It is easier for retarded children to think with concrete rather than abstract material. They learn by repetition rather than by reasoning, usually being excellent spellers. Bright children as a rule find tasks of rote memory irksome, spelling being their weakest subject. They succeed better with abstract than concrete material, as they enjoy reasoning things out.

(4) Younger children have a shorter attention span and their power of concentration is not as well developed as that of older children. One-fifth of the normal children failed to recall four objects, while practically all of the subnormal children remembered at least that many.

In discussing the Ellis Memory for Objects Test with the writer, Dr. Rudolph Pintner of Teachers College in New York City said that a test of visual memory is usually a poor test

[3] B. Bourbon. "Influence de l'age sur le memoire immediate." Revue Philosophique, Vol. 38, 1894.

of intelligence, referring to Whipple[4] as an authority for his statement. At his suggestion the Ellis Memory for Objects Test was given to a group of 100 children at the same time as the Stanford-Binet Examination. Their mental ages on the latter test ranged from five years no months to eight years six months. The correlation between their mental ages on the Binet and their scores on the visual memory test was .336 $\pm$ .05, which proved Dr. Pintner's statement.

It would be interesting to make further studies of this nature with various types of tests to see whether the same difference holds. Such studies would serve as a check on the validity of norms based on mental age. It might even be found desirable to establish two sets of norms, one for normal and the other for subnormal children.

[4] G. M. Whipple. "Manual of Mental and Physical Tests." Warwick and York, Baltimore, 1915.

AN EXPERIMENTAL STUDY OF THE KENT–SHAKOW INDUSTRIAL FORM BOARD SERIES

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NATURE AND SCOPE OF THE STUDY

AN important contribution in the field of performance tests was the graded series of form boards by Kent and Shakow[2] that appeared early in 1928. These form boards introduced some very novel principles in form board construction. Upon *a priori* grounds this test series seemed to offer many valuable possibilities as a clinical instrument. One of its most promising features was its appearance of being sufficiently difficult in certain aspects to render it discriminative at the adult level of ability. This was a serious shortcoming of most of the performance tests that had appeared prior to this one. As a result there has been a definite scarcity of performance tests suitable for administration to adults, unless the adults involved tended to be of very limited ability.

The writer had become interested in the industrial model of the Kent-Shakow form boards and some of the principles incorporated in it as a result of a very limited laboratory experience with the test. This experience had brought to light a number of questions which could not be answered because no standardization of the series was available.

It was decided to submit this form board series to an exploratory and tentative experimental study using as subjects a group of adult prisoners at the Western State Penitentiary of Pennsylvania.[3]

[1] Assistant Psychologist, Western Penitentiary, Pittsburgh, Pa.

[2] Grace H. Kent and David Shakow. Graded Series of Form Boards, *Personnel Journal*, Vol. 7 (1928), No. 2, pp. 115–120.

[3] Such a study was suggested by Dr. O. L. Harvey, at that time instructor in psychology at University of Pittsburgh, and was made pos-

PROCEDURE

Two hundred native white male prisoners were selected at random from among those incarcerated at Western Penitentiary. Negroes and foreign born whites were excluded to eliminate linguistic and racial complications. The industrial model of the Kent-Shakow Form Board Series was administered to each one of the subjects selected.

The instructions of the authors for the administration of the test were followed with few exceptions. However, time limits were disregarded, and failures for separate tests of the series were recorded only when the subject demonstrated beyond reasonable doubt his inability to complete the task assigned. If after ten minutes the subject showed no evidence of any progress toward a solution, it was assumed that the task was beyond his ability to complete. If there was any evidence of progress, however, the subject was encouraged to continue as long as necessary. Furthermore, failure on any diagonal test was not taken as an indication that the subject had reached his limit. All tests of the series were presented to all subjects regardless of failures on previous tests.

It was found necessary to see that one block from the end of each recess in the diagonal series was turned over before the blocks were shuffled at random for presentation to the subject. This tended to minimize the element of chance in the solution of the various tasks. The subject was encouraged as much as possible to complete each test, but no questions with reference to the tests were answered except to give assurance that all tasks assigned were possible.

Time was recorded for each test in decimal parts of a minute. This was done because of the greater facility of statistical manipulation thus made possible. Supplementary notes on the performance of each subject were taken in order to provide a check upon the subjective evaluation of various factors encountered.

Other data used in the study consisted of the mental age of

sible by the cooperation and assistance of Dr. G. I. Giardini, psychologist at Western Penitentiary.

each subject as determined by the Stanford Revision of the Binet-Simon Intelligence Scale. In the case of one of the 200 subjects, the Binet mental age was not available. In addition to this the raw score of the Illinois General Intelligence Test, Examination I, Form 2, was available for all cases except nineteen subjects who were illiterate or excused from the test because of age. These data were taken from the files of the Psychology Department of the Western Penitentiary.

RESULTS

In order to show clearly the nature of the data, the arithmetic mean and standard deviation of the time for each separate test of the series were calculated. These are shown in Table I. The data here presented are based upon the time that it took each subject to complete successfully each test of the series. Failures in terms of percentage of the whole group are listed in a separate column. It must be borne in mind that the criterion of failure in this study was not the time limits proposed by the authors of the tests.[4]

TABLE I

Mean, Standard Deviation and Failures for Each Test of the Kent-Shakow Series

200 Cases — Time in minutes

TEST	MEAN	S.D.	FAILURES	PER CENT OF FAILURES
2S	.53	.24	0	0
2D	.56	.18	0	0
3S	1.59	1.08	0	0
3D	2.68	1.91	1	0.5
4S	2.15	1.48	1	0.5
4D	5.95	3.03	35	17.5
4DD	4.37	1.91	28	14.0
5D	7.17	2.61	77	38.5

In Table II the same data have been tabulated in percentile form. This arrangement gives a better idea of the actual distribution of time scores. The discrepancies between the

[4] *Loc. cit.*, p. 119.

medians (50 percentile, Table II) and the means (Table I) for the different tests of the series are to be explained by the skewness of the several distributions and by the fact that in the calculation of means failures were not taken into account which was not true in the calculations of medians.

TABLE II

Percentile Table of Time Scores for the Kent-Shakow Series

200 Cases — Time in minutes

PERCENTILES	2S	2D	3S	3D	4S	4D	4DD	5D
100	.16	.17	.61	.75	.72	1.57	1.37	3.03
90	.33	.36	.79	1.19	1.11	3.03	2.36	4.64
80	.37	.41	.95	1.42	1.26	3.66	2.81	5.61
70	.41	.46	1.06	1.66	1.42	4.2	3.28	6.61
60	.45	.49	1.18	1.9	1.59	5.08	3.93	7.83
50	.48	.53	1.32	2.19	1.78	5.95	4.39	9.7
40	.52	.57	1.48	2.55	1.98	7.18	4.89	13.0
30	.57	.61	1.66	2.95	2.26	9.45	5.89	F
20	.64	.68	1.93	3.38	2.59	12.6	8.0	F
10	.76	.76	2.57	4.41	3.44	F	F	F
0	2.49	1.42	8.72	F	F	F	F	F

Tables I and II offer some check upon the validity of time limits proposed by the authors for the several tests. The proposed time limits were as follows: 3S, 3 minutes; 3D and 4S, 4 minutes each; 4D, 4DD and 5D, 7 minutes each. The data obtained in this study seem to indicate that a revision of time limits is desirable, especially for tests 4D and 5D, where the time limits proposed seem unduly low. The writer is aware, however, that the data here quoted do not offer an adequate basis for the determination of satisfactory time limits.

The authors' statement that individual variations run high among subjects of any class[5] is well illustrated by Table III. This table is merely a distribution of the cases that failed test 5D on a basis of their mental ages as calculated by the Binet-Simon scale. It will be noted that the failures embrace a wide range of mental ages.

[5] *Loc. cit.*, p. 120.

TABLE III

Distribution of Failures on 5D according to Binet Mental Age

M.A.	NO. CASES	FAILURES	PER CENT OF FAILURES
18 and above	5	0	0
17 to 17–11	10	3	30
16 to 16–11	15	3	20
15 to 15–11	14	5	36
14 to 14–11	25	9	36
13 to 13–11	30	10	33
12 to 12–11	30	14	47
11 to 11–11	33	13	39
10 to 10–11	21	10	48
9 to 9–11	7	4	57
8 to 8–11	8	4	50
7 to 7–11	1	1	100
Total	199	76	38

Experimentation with the authors' published scoring chart[6] and with a revision of that scoring chart proposed by Kent in correspondence with the writer led to the discarding of both of these in treating the data of this study. This was decided upon because it was evident that a unit of time is not of equal significance throughout the tests individually or taken successively. It was noticed that as a general rule more was accomplished during the first minute than during the last minute of any given performance. When the marked differences in standard deviations of the several tests (Table I) are taken into account, it is quite apparent that an arbitrary unit of time does not have equal weight from test to test. A scoring chart based upon standard deviations of the respective tests did not prove satisfactory and was also discarded.

Finally a method of scoring the total performance of any individual on the series as a whole was devised by use of percentiles of time for each test of the series as recorded in Table II. If a subject's time for any separate test fell below

[6] *Loc. cit.*, p. 119.

the 10 percentile, he was given a score of 1 for that test. Similarly a performance falling between 10 and 20 percentiles was scored 2, between 30 and 40 percentiles, 3, etc. Failures were scored 0. When a subject's score for each separate test of the series had been thus computed, the total gave the subject's point score for the series as a whole.

TABLE IV

Percentile Table of Point Scores, Binet Mental Ages and Illinois General Intelligence Scores

PERCENTILE	POINT SCORE	BINET M.A.	ILL. SCORE
100	80.0	19–6	153.0
90	69.2	16–5	111.8
80	61.0	15–5	94.6
70	54.8	14–5	83.8
60	50.3	13–8	74.6
50	43.3	13–0	66.9
40	35.5	12–4	59.2
30	33.6	11–9	52.3
20	25.5	11–2	43.4
10	12.2	10–2	33.3
0	4.0	7–2	9.0

A percentile table of point scores for the 200 cases used in this study is given in Table IV. So far as this study yielded any norms, they are incorporated in this table. Comparable data for Binet mental ages and Illinois general intelligence scores are also included in the table in order to show the general level of the group used. The writer is aware of the fact that these are of very questionable general utility in view of the small number of cases and the nature of the group upon which they are based.

Eighteen of the subjects used in this study were below 20 years of age, 121 were between 20 and 30, 40 were between 30 and 40, 13 were between 40 and 50, while 8 were 50 or above. In general it was found that increased chronological age had a negative effect upon the quality of the performance on this form board series. What the critical median age is at which this decline starts or the underlying causative factors

of it could not be determined because of the limitations of the data at hand.

Coefficients of correlation have been computed by the product-moment method for most of the data used in this study. These are presented in Table V. The correlations between time scores for each separate test of the Kent-Shakow series and the Binet mental age are quoted in this table also. It was not the intention of the writer to use the linguistic tests as criteria of validity, but the correlations are presented for comparison purposes only.

In conclusion, the writer feels justified in pointing out that much more experimentation will be necessary to render this form board series as valuable a clinical instrument as it seems capable of becoming. For the present, at least, any norms

TABLE V

Coefficients of Correlations between Tests Used in the Study

RELATIONSHIP BETWEEN		NO. CASES	r	PE_r
Binet M.A. and Point Score		199	.432	.027
Illinois Score and Point Score		181	.462	.027
Illinois Score and Binet M.A.		180	.767	.021
Binet M.A. and time for	2S	199	.364	.030
	2D	199	.382	.029
	3S	199	.347	.031
	3D	198	.212	.037
	4S	198	.292	.034
	4D	165	.217	.041
	4DD	172	.196	.041
	5D	123	.244	.043

collected should be on the basis of time for the separate parts of the series rather than in scores for the whole performance. This will make possible the development of a more sensitive general scoring system. This is one of the outstanding needs of this form board series at the present time.

RANGE AND DISTRIBUTION OF MENTAL ABILITIES IN A GROUP OF HIGH-GRADE MENTAL DEFECTIVES

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VOCATIONAL *selection* is concerned, among other problems, with individual differences, that is, with how people differ or vary with respect to any given aptitude. Vocational *guidance,* on the other hand, is concerned with the manner in which a person differs within himself in his aptitudes for success in the various possible activities or vocations. Although the latter phase of differential psychology is tremendously important to the individual it has received but scant attention in the literature.

One of the most important investigations of this problem was made by Hull.[1] His material consisted of 35 series of test scores for 107 first year high school students. The distribution of scores for each indivdual was plotted. There appeared in the trait distributions a "distinct tendency to approach the characteristic shape of the normal probability curve." More significant, according to Hull, was the extent or range of these differences. "If no differences exist, *i.e.*, if the various traits of an individual are all equal or approximately equal in amount, he can do one thing about as well as another.

This would mean that special aptitudes do not exist and that time spent seeking them would be wasted. "If, however, it should turn out that the various talents of the individual are highly diversified, a presumption would be established in favor of significant specialization of vocational aptitudes."

[1] Clark L. Hull. Variability in amount of Different Traits Possessed by the Individual. Journal of Educational Psychology, Vol. 18, 1927. pp. 97–106.

From the data collected, Hull concluded that the trait differences average approximately 80 per cent as great as individual differences. In discussing this experiment in his book, Aptitude Testing,[2] Hull concludes that this variability within the individual "means that the average individual's test vocational potentiality must be between two and one-half and three times as good as his worst." He goes on to say that if vocational choices are left largely to chance, as is evidently now the case, it will be very rare that an individual will choose the one vocation in which his aptitude is greatest. "Indeed by mere chance he would be about as likely to choose his worst. Such a mistake would be both a personal and a social tragedy of the first order."

In this paper the writer will report a study of trait differences in high grade mental defectives. Inasmuch as nine-tenths of our mentally defective population remain in the community where they present a pressing social problem (dependency, delinquency, etc.) the importance of their adequate adjustment cannot be overstated. Obviously, distribution of special abilities is one significant factor in this adjustment.

The subjects for this experiment were 38 mental defectives, both sexes, over 16 years of age, testing between 50 and 70 IQ. (Stanford-Binet).

Each subject had approximately six hours of testing, with 34 traits investigated. Several test batteries, described below, each yielded a group of tests. Tests were chosen to suit this mental level as follows:

I. *Army Group Examination Beta.* Procedure and scoring, Army mental tests, Yoakum and Yerkes, Henry Holt and Co. 1920, p. 79 ff. Materials were charts drawn on heavy cardboard 27 × 27 in.; 3-inch cubes of wood. Blanks published by Stoelting and Co.; 7 tests.

II. I. E. R. *General Clerical Test.* Published by Institute of Educational Research, Teachers College, Columbia University, New

[2] Clark L. Hull. Aptitude Testing. World Book Co., Yonkers-on-Hudson, New York, 1928. p. 49.

York City. Procedure and scoring furnished with materials. 10 tests.

III. *Primary Stanford Achievement Test.* Published by the World Book Co., Yonkers-on-Hudson, N. Y. Procedure and scoring furnished with the material. 5 tests.

IV. Vocabulary from Stanford Revision of the Binet-Simon Test. Procedure, L. M. Terman, Measurement of Intelligence, p. 224.

V. *Trabue-Kelley-Spivak Language Test.* Described in *Manual* of Individual Tests and Testing, Bronner et al. Little Brown and Co., Boston. 1927, p. 42. Procedure and Scoring, Stoelting and Company.

IV. *Healy Pictorial Completion Test II.* Described in Bronner's Manual above, p. 52. Material—Stoelting and Co.

VII. Porteus Maze. Material supplied by Department of Research, Training School at Vineland, N. J. Procedure and Scoring. Bulletin No. 25 of this department.

VIII. *Dearborn Form Board 3.* Material, Stoelting. Procedure and Scoring, Army Mental Tests. p. 107 ff.

IX. *Judge Baker Foundation Scaled Information Test.* Procedure and Scoring, Stoelting.

X. Auditory Memory Span. Bronner's Manual, p. 69. 2 tests.

XI. Whipple-Healy Tapping Test. Bronner's Manual, p. 144.

The first step in the treatment of data was to transmute test scores into equivalent series. The method chosen was that described by Holzinger.[3] Using this method it was necessary to compute first the means and standard deviations of each of the original 34 series. The statistical proportions of such an equivalent series are arbitrary: the writer employed a mean of 50 and a standard deviation of 14.

With the transmuted equivalent scores it was necessary next to determine the extent of trait variability. Accordingly for each individual there was computed the standard deviation of the 34 scores. These standard deviations ranged from 7.8 to 15.7, with a mean of 11.2. The range of trait variability indicates that some individuals are about twice as variable as others.

Since our arbitrary standard deviation for the equivalent series was 14, this figure may be considered to represent the

[3] Holzinger, K. J. Statistical Methods. Ginn and Co., 1928. pp. 112–122.

individual differences for all the traits studied and serves us as a standard of comparison. Our data would indicate that on the average the range of ability in high grade mental defectives is $\left(\frac{11.2}{14}\right)$ or 80 per cent as great as the individual differences.

The distribution of scores for each individual was plotted. In all cases there was present a decided central tendency and in a large percentage of cases some approach to the normal distribution. No case presented a picture of extreme asymmetry.

Hull's conclusions were based on a study of normal individuals. The repetition of his experiment with mentally defective persons, with a somewhat better selection of tests, serves to confirm his conclusions concerning both the range of trait differences and their characteristic distribution.

THE RÔLE OF PURPOSE IN ACHIEVEMENT

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FOR purposes of prediction various efforts have been made to discover the factors involved in scholastic achievement. Such factors as intelligence, age, initial ability, effort, personality have all been studied, and each one has some value in making the prediction of achievement somewhat more accurate. There is one factor, however, which has not been specially investigated by most writers in this field, and that is the factor of purpose defined as the motive or the reason which a student has when he registers for a particular course of study.

Book[1] asked 147 students entering a course in psychology to state their real purpose in taking the course. Sixty-six per cent stated that they took the course because it was required and only twenty-two per cent stated that they had some interest in the course when they enrolled. Following up this suggestion English[2] found that students approach the study of psychology without a specific motive. Book and English, however, did not study the effect of purpose on scholarship. Crawford[3] in an extensive study carried on at Yale University found that students with a definite occupational purpose excel in scholarship. He suggested, therefore, that this factor of occupational purpose be considered more seriously in the process of selective admission. A purpose which the student can appreciate and understand is "after all the most natural and effective intellectual stimulus to favorable academic work."

[1] Book, W. F. "How to Develop an Interest in One's Tasks and Work," *Journal of Educational Psychology*, 18: 1–10, 1927.

[2] English, H. B. "Why Students Register for Psychology," *Journal of Applied Psychology*, 12: 242–244, 1928.

[3] Crawford, A. B. *Incentives to Study.* Yale University Press, 1929. XII + 194 pp.

THE PROBLEM AND THE EXPERIMENTAL PROCEDURE

The problem of this paper is, therefore, to determine more specifically than has been done the part that purpose plays in achievement. Purpose is defined here as the reason or the motive which a student has in registering for the particular course of study designated below.

Groups Used. A group of seventy-five students taking a graduate course in Clinical Sociology at Teachers College, Columbia University, were used as subjects. The class was comprised of mature persons whose registration for the course was entirely voluntary except that some had to choose between this or some other course for point requirements. Nineteen fields of educational endeavor were represented by this group; the largest number were majors in educational psychology.

Measures Used. (1) Achievement was measured by an objective test which was given at the beginning and again at the end of the course. The reliability coefficient of the test is .850. The test is comprehensive—covering the material of the entire course. The items of the test were selected because by them it was possible to differentiate between the lower and upper quartiles (selected on the basis of the total test results) of a similar group. On this basis the test may be considered valid. The score on the final test will be used here as the measure of achievement. (2) The purpose the student had in taking the course was discovered by the following procedure. At the first meeting of the class the students were requested to fill out registration blanks on which they were asked to state why they registered for this course. The students were urged to indicate only the *real* purpose or reason they had in taking the course and were definitely and emphatically informed that this would not influence their grades. From the reasons given a check list of fifteen purposes was prepared. Later, at the fifth meeting of the class (which convenes once a week), the student checked the *one* most important purpose he had in taking the course. There was a seventy-six per cent agreement between the check list and the registration blank. With this set up and with the agreement found between the check list and the

statement on the registration blank, it is felt that purposes thus revealed can be considered seriously.

The same list was given to the students when they were asked to rank the fifteen purposes according to which purpose they judged would be most likely to be productive of high scholastic achievement. The median rank was then calculated for each purpose and these ranks converted into linear scores on a 10 point scale according to Hull.[4] This method of converting ranks into linear scores makes one important assumption—that of normality of distribution of the trait in question. Although purpose did not yield a normal distribution with the sampling in hand, nevertheless it was deemed of value to find out what the results would reveal if the data were treated in this manner, so that Pearson r's might be calculated.

Table I presents the fifteen purposes, together with the number checking each purpose on the check list, the median rank received, and the converted linear scores.

(3) Other measures available for these students were intelligence ratings obtained from results of the Teachers College General Examination for Mental Ability, initial information as measured by the first test, and time spent in reading for the course,[5] obtained from weekly reports made by the student. A fourth measure used, which aimed to measure a student's progress in the course, was calculated from both the initial and final scores and will be referred to hereafter as "percentage improvement," the formula for which is:

$$\frac{\text{Final Score} - \text{Initial Score}}{\text{Total Possible Score} - \text{Initial Score}}$$

[4] Hull, C. L. *Aptitude Testing*, pp. 491–492. World Book Co., 1928, Yonkers, N. Y.

[5] The diary method of a week's study (Spence, Crawford, and others) was rejected in favor of the weekly report, in order to guard against the possibility of unrepresentative sampling of time resulting from special conditions for a limited period, *e.g.*, a tendency to pad the time spent during the diary week.

TABLE I

Number Checking Each Purpose, Median Rank Received, and Converted Linear Scores

LETTER ASSIGNED EACH PURPOSE	PURPOSE	NUMBER CHECKING EACH PURPOSE	MEDIAN* RANK	LINEAR SCORE
J	To help me solve my professional problems	24	2.4	7.4
B	Desire to add to my sociological knowledge	10	3.0	6.9
I	Educational sociology is my major field of interest	6	4.0	6.4
M	To learn of the visiting teacher movement	4	5.3	5.9
N	To make contact with clinics available in their relationship to the schools	5	5.5	5.8
O	To broaden my knowledge in general ("a cultural course")	1	6.0	5.7
C	To take a first course in sociology	3	9.3	4.6
A	To fulfill requirements for "general course" for Ph.D. or M.A. degree	7	9.4	4.5
F	By advice of adviser	5	9.7	4.4
E	As required course in sociology for license examination	0	10.0	4.3
L	To be able to display a knowledge of sociology for the sake of status in my group	0	10.1	4.3
G	By advice of friends or other students	1	11.7	3.7
K	Catalogue description was attractive	2	12.0	3.6
D	For three points credit	2	13.7	2.7
H	Convenient hour	3	15.0	1.5

* Arranged as ranked by students in order of importance. Purpose J received the highest rank and purpose H, the lowest.

TREATMENT OF THE DATA

Correlation coefficients were computed between the several factors to determine the existence of any relationship. Mean scores and differences between means were used to note the influence of purpose on achievement.

RESULTS

Correlation coefficients between purpose and the several measures are presented in the tabulation below:

TABLE II

	2. Initial score	3. Intelligence rating	4. Final score	5. Time spent in reading	6. Percentage improvement
		N = 60			
1. Purpose	.31 ± .08	.03 ± .09	.27 ± .08	.18 ± .08	.13 ± .03

The partial correlation coefficients obtained are as follows:

$r_{14.2} = .13 \pm .09$ $\quad$ $r_{14.3} = .30 \pm .08$

$r_{14.23} = .17 \pm .08$ $\quad$ $r_{15.2} = .31 \pm .08$

$r_{14.235} = .08 \pm .09$ $\quad$ $r_{15.23} = .31 \pm .08$

Although all these correlations between purpose and the other factors are low, yet it will be noted that there is some relationship between checking purposes that were ranked high as being most likely to be productive of high scholastic achievement and final score, as noted by an r of .27. The correlation between purpose and initial score also shows some relationship ($r = .31$), namely, those taking the course for professional reasons or for acquiring more sociological information apparently begin the course with slightly more knowledge of the subject[6] than those who take the course because they need the points or because the hour is convenient, etc.[7] The correlations between purpose and intelligence rating and between purpose and time spent in reading indicate very little relationship. The r of .13 between purpose and percentage improvement is somewhat lower than that between purpose and final score and does not indicate any very positive relationship between purpose and the amount of improvement in the course.

The correlation between purpose and the final score decreases to .13 when the initial score is held constant, but when intelligence is held constant it increases to .30. When initial

[6] The initial mean score for "professional purposes" (J, B, C, I, M, N, O) is 54.17.

[7] The intial mean score for "non-professional purposes" (A, D, F, G, H, K) is 53.35.

score and intelligence are held constant, the partial correlation coefficient is .17. But these r's are all too low to make any valid generalizations. It is interesting to note, however, that the r between purpose and time spent in reading when the initial score is held constant is as high as .31 and there is no change when both initial score and intelligence are held constant. This correlation is supported further by the fact that the mean hours spent in reading for those checking "professional purposes" (J, B, C, I, M, N, O) is 36.51 as contrasted to a mean of 31.85 hours for those checking "non-professional purposes" (A, D, F, G, H, K). This suggests that the purpose the student had in taking the course shows slight possibilities of causative conditioning of both the effort he puts forth as measured by the time spent in outside reading for the course and his final score.

Since the correlation treatment of the data revealed so little that is of value, and the number of cases was so limited, other statistical methods were employed in an attempt to discover if purpose played any rôle in achievement.

The mean final score and the mean percentage improvement were calculated for those checking each purpose. The results are given in Table III.

TABLE III

Mean Final Score and Mean Percentage Improvement for Each Purpose

PURPOSE (AS IN TABLE I)	NUMBER CHECKING EACH PURPOSE	MEAN FINAL SCORE	MEAN PERCENTAGE IMPROVEMENT
J	24	103.55	41.65
B	10	99.00	39.50
I	6	107.50	50.00
M N*	9	94.15	38.60
O	1	77.50	22.50
C	3	110.85	52.50
A	7	97.50	30.35
F	5	97.50	38.50
E	0	.....	.....
L	0	.....	.....
G	1	97.50	22.50
K	2	105.00	47.50
D	2	102.50	40.00
H	3	80.50	30.85

* Purposes M and N were grouped because of similarity in both content and rank value.

For the group as a whole the mean[8] score on the final test was 101.05 with a sigma of 16.90. Those checking purposes C, I, K, J, and D all received higher mean final scores than the mean for the entire group. Three of these five purposes—C, I, and J—may be considered those which common sense might expect to call forth higher achievement than others. Those checking purpose C, which reads "To take a first course in sociology," received the highest mean score (110.85). This does not indicate, however, that these people started with little knowledge and, therefore, had the greatest opportunity to achieve because the total possible score on the test used was 168; the initial mean score for the entire group was 56.10 and for those checking C it was 50.00. It is significant that those checking purpose H (Convenient hour) received next to the lowest mean score.

For the group as a whole, the mean[9] percentage improvement was 40.25 with a sigma of 13.45. Those checking purposes C, I, K, and J have a greater mean percentage improvement than the mean for the entire group. This is in perfect agreement, except for the omission of purpose D (For three points credit), with the analysis for the final score. Again, it may be observed that those checking "professional purposes" improve somewhat more than those who do not check such purposes. However, since there is a very high correlation between final score and percentage improvement ($.85 \pm .02$), this factor and not the purpose factor may account for the above similarity. The least amount of improvement was made by those checking purposes O and G followed by A and H. Three of these (G, A, H) deal with course requirement, convenient hour, and the like.

From the foregoing it appears that those checking purposes "To take first course in sociology," "Major in educational sociology," and "Help in solution of professional problems," show in this order the highest results by both the measures of final score and percentage improvement.

[8] Based on 76 cases.

[9] Based on 76 cases.

In view of the numbers of cases in the categories of the foregoing analysis, it was thought best to divide the purposes into two groups by combining purposes A, D, F, G, H, and K against all the others (B, C, I, J, M, N, and O).[10] Purposes A, D, F, G, H, and K are all concerned merely with scholastic status such as "For three points credit" or "To fulfill requirements," etc., or "Convenient hour;" while purposes B, C, I, J, M, N, and O are all concerned with professional advancement or with acquiring sociological information, etc.

When purpose was thus dichotomized and correlated against final score, the biserial correlation found was .27, showing exactly the same degree of relationship between these two factors as did the obtained Pearson *r* of .27. The biserial between purpose and percentage improvement was .209.

For each classification of purpose, the mean final scores and the mean percentage improvement were calculated. The differences between the means on final score and on percentage improvement for the two combinations of purposes were obtained with the significance of these differences. The results are presented in Table IV.

Those expressing "professional purposes" (B, C, I, J, M, N, O) received a mean final score of 103.65 against a mean final score of 96.00 for those expressing "non-professional purposes" (A, D, F, G, H, K); the difference between the means being 7.65 in favor of the former. Although the significance of the difference between these means is only 2.009 times its standard deviation, yet the chances are that 98 times in 100 the difference between the mean final scores of any similar group expressing these two purposes will be greater than O and in favor of those who take the course for professional reasons. But there are only 2 chances in 100 for the possibility of negative direction.

In brief, there is a clear tendency that those checking purposes which are related to professional use or to acquiring information in the field of sociology will make a higher mean

[10] Purposes E and L are omitted because they were not checked by any member of the group.

TABLE IV

Difference Between Mean Final Scores for Each Classification of Purpose

PURPOSE	N	MEAN FINAL SCORE	S.D.	$S.D._M$	DIFF.	$S.D._{diff.}$	$\frac{DIFF.}{S.D._{diff.}}$	CHANCES IN 100
Checking B, C, I, J, M, N, O "Professional"	53	103.65	17.40	2.390	7.65	3.808	2.009	98
Checking A, D, F, G, H, K "Non-Professional"	20	96.00	13.25	2.964				

TABLE V

Difference Between Mean Percentage Improvement for Each Classification of Purposes

PURPOSE	N	MEAN PERCENTAGE IMPROVEMENT	S.D.	$S.D._M$	DIFF.	$S.D._{diff.}$	$\frac{DIFF.}{S.D._{diff.}}$	CHANCES IN 100
Checking B, C, I, J, M, N, O "Professional"	53	41.95	13.80	1.896	4.70	3.187	1.47	93
Checking A, D, F, G, H, K "Non-Professional"	20	37.25	11.45	2.562				

score than those checking purposes which are related to point or course requirement or convenient hour, etc.

In considering percentage improvement, it may be said that the chances are 93 in 100 that those checking "professional purposes" will make a greater improvement than those checking "non-professional purposes." In this case also the difference is not completely reliable but the tendency for the group checking "professional" purposes not only to achieve more but also to improve to a greater extent, is quite clear.

CONCLUSIONS

1. With 76 per cent agreement between the check list and the registration blank, it is possible to obtain from students a reliable statement of the purposes they have in registering for a course.

2. By simple correlations, purpose seems to show slight relations to initial score and final score but no relations to intelligence rating, time spent in reading, and percentage improvement.

3. But by partial correlations, purpose seems to bear no significant relationship to final score when initial score and when both initial score and intelligence are held constant. But when intelligence alone is held constant, this relationship becomes slightly more significant.

4. But when initial score and when both initial score and intelligence rating are held constant, time spent in reading in relation to purpose appears more significant. Thus purpose bears upon effort more significantly than upon final score.

5. A comparison of mean final scores and mean percentage improvement reveals that those checking "sociological knowledge" and "professional use" (C, I, J) showed higher results by both measures.

6. When purposes are dichotomized by combining those that are related to "professional" reasons against those of "non-professional" reasons, it is found that there is a tendency for students who registered for the course for the purpose of ac-

quiring information or for the purpose of advancing professionally to achieve more and improve more markedly than those who register for the course because they need the three points credit or because a friend advised them to take the course or because the hour was convenient.

Finally, it appears, tentatively, that those students whose purposes for joining this course are allied to genuinely scholastic aims, have a tendency to higher achievement and to greater improvement.

OCCUPATIONAL DIFFERENCES IN COLOR-BLINDNESS

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INTEREST in possible occupational differences in color-blindness (especially the failure to discriminate red and green) was stimulated by the work of Miles and Craig.[1] After finding twenty-seven color-blind drygoods salesmen among 375 tested, they wrote, "we asked ourselves if it could be possible that industry has special places of usefulness for color-blind individuals. . . . Brightness matching is secondary to chroma matching, but it is just the additional part that when well done makes the combination perfect. If the color-blind salesman did not realize his own limitations and work within his own ability the natural supposition is that he might repeatedly have goods returned, become discouraged and finally be discharged for no other reason than this, that he was not able to perceive a distinct subjective difference between red and green. Is industry selecting or eliminating these people?" To their own question Miles and Craig replied that their study shows that the job of drygoods selling does not tend to select color-blind men nor does it tend to eliminate them since no more or no less color-blindness was found than in the general population.

The question naturally arises as to the frequency of color-blindness among members of other occupations whose work requires color discrimination. For example, how often do color-blind men become painters? Furthermore, are color-blind men likely to be good painters? Or do color-blind men tend to be eliminated from this occupation? What about the prevalence of color-blindness among truck drivers and chauffeurs? Considering the fact that red-green color-blindness is most common, and that red and green are the usual safety signals, does it not seem advisable that color-blind men should be guided away from this occupation into some other in which this defect would not be a serious handicap? Some idea of the gravity of the problem may be formed on the basis of the estimate that there are some 100,000 color-blind motorists licensed in England.[2]

An experiment was conducted to secure data about these two occupations. A color-blindness test was given to several hundred applicants appearing at the Cincinnati Employment Center which is a Federal-State-

[1] W. R. Miles and Homer Craig, Jr. "Color-Blindness among Drygoods Salesmen." *Personnel Journal*, 1930–31, 9, 437–449.

[2] A. F. Dutton, "Colour Blind Motorists and Red Danger Signs," *Nature*, 1932, 130, 967.

City public employment office. These applicants had been classified on the basis of previous occupational experience.

The Ishihara test[3] was used. A color-blind diagnosis was made if the applicant failed to read correctly the numbers on two or more cards. The plates were held about three feet from the subject and in natural light (near a north window). The testing of the first three samples of

TABLE I

Frequency of Color-Blindness Among Samples of Men-in-General and Various Occupational Groups

OCCUPATION	NUMBER TESTED	COLOR-BLIND	PER CENT	AUTHOR
Men-in-general	2,000	159	7.95	von Planta
Men-in-general	448	35	7.8	Haupt
Men-in-general	1,840	155	8.42	Miles
Total	4,288	349	8.14	
Salesmen	375	27	7.2	Miles & Craig
Painters	124	10	8.0	(First sample)
Union Painters	69	2	2.9	(Second sample)
Non-union Painters	90	6	6.7	(Second sample)
Union Painters	103	4	4.0	(Third sample)
Non-union Painters	127	11	8.7	(Third sample)
Union Painters	60	3	5.0	(Fourth sample)
Non-union Painters	169	14	8.3	(Fourth sample)
Total Union Painters	232	9	3.88	
Total Non-union Painters	386	31	8.03	
Total Painters	742	50	6.7	
Truck drivers	1,076	72	6.69	
Chauffeurs	104	6	6.0	

painters was administered either by the writer or in his presence; later tests were given by assistants who had been instructed in the technique of testing. The results are shown in the accompanying table.

The first sample tested showed that 8.0 per cent of the 124 painters were color-blind,—a figure closely in line with results usually found for men-in-general. It was then thought advisable, in additional testing, to tabulate color-blindness according to union or non-union membership. Since, in the long run, union painters might be expected to be more expert than non-union painters, a difference in frequency of color-blindness would

[3] S. Ishihara, *Tests For Colour-Blindness*, Kanehara & Co., Tokyo. (Distributed by C. H. Stoelting Co., Chicago). Also Elsie Murray, "The Ishihara Test for Color-Blindness: A Point in Ethics," *The Am. Journ. Psychol.*, 1935, 47, 511–513.

reveal that the condition does have some occupational significance. The results for this second sample, and also for the two additional samples, show that there are fewer color-blind men among union painters than there are among non-union painters or in the general male population. When the results for samplings 2, 3, and 4 are combined, a statistically significant difference is revealed. These results suggest but do not prove that color-blindness is probably a handicap in the trade of painter. A written trade information test was administered to a sample of 221 painters of whom 15 were color-blind. The median score of the 15 was seventy per cent while the median score of the normal group was eighty-five per cent; the difference is not significant, being 3½ times its P.E. Further testing with a larger sample seems desirable.

When the same test was applied to 1,076 truck drivers and to 104 chauffeurs, a surprising amount of color-blindness was disclosed. One must remember that these are applicants for work. It can be assumed that they are for the most part unemployed and that color-blindness itself may be a contributing cause of un-employment. Further research on this point is under way. Data on accident rates for color-blind and for non-color-blind truck drivers and chauffeurs would be desirable. Also data on the prevalence of color-blindness among truck drivers and chauffeurs with long and satisfactory service records would be helpful.

Color-blindness may not be a handicap in some instances, *e.g.* in work where ability to match brightnesses may serve as a compensatory mechanism for inability to match colors, nevertheless, in most occupations involving color discrimination, color-blindness would appear to be a definite handicap. Color-blind persons should probably not try to engage in these types of work. If further research confirms this view, then sensory tests would be valuable instruments in vocational guidance.

THE CORRELATION BETWEEN THE RANDALL'S ISLAND PERFORMANCE SERIES AND THE KUHLMANN-BINET

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THE Randall's Island Performance Series, published in 1931,[2] was devised to supplement and corroborate the findings of the Kuhlmann-Binet, and also to provide a non-verbal scale for children with a language handicap and for foreign adults of low mentality, for the deaf, and for subjects with a marked speech defect. Heretofore, selected tests from the Kuhlmann-Binet had been used for cases of this type. It was, therefore, felt that a series of performance tests was necessary in the two, three, and four year levels.

The separate tests used in the Randall's Island Performance Series were selected from various sources and had previously been standardized on chronologically selected cases. The Randall's Island investigation was made in order to see if the same results would be obtained on older retarded cases and also to combine these tests into a unified series covering a wide range of functions. The tests are now arranged in functional units.

In the original study 77 cases were used, 27 in the three year group, and 25 each in the two and four year groups.

The present investigation was undertaken in order to determine if the prognosis from the original 77 cases would hold true.

Two hundred cases who had been given both the Kuhlmann-Binet (or in a few cases, the Stanford-Binet) and the Randall's Island Performance Series were used in this study. As in the original work those cases were excluded who had a history of convulsions, neurological cases with a handicap in the upper extremities; in fact, all those with a physical or mental condition which might invalidate the test results.

The chronological age in the original study was limited to those below 15 years, the range being from 3 years 5 months to 14 years 11 months, with a median of 8 years .6 months, and a Q of 2 years 1.08 months. (See Table I.)

[1] In collaboration with L. E. Poull, Ph.D., Psychologist, New York City Children's Hospital, Randall's Island.

[2] The Randall's Island Performance Series, Dr. L. E. Poull, 1931, Columbia University Press, N. Y.

TABLE I

75th percentile	10 yrs. 6.4 mos.
Median	8 yrs. .6 mos.
25th percentile	6 yrs. 4.25 mos.
Q	2 yrs. 1.08 mos.

The IQ range was from 18 to 77 on the Kuhlmann-Binet with a median of 41.75 and a Q of 12.3. (See Table II.)

TABLE II

75th percentile	56.96
Median	41.75
25th percentile	32.36
Q	12.3

And on the Randall's Island Performance Series from 18 to 78 with a median of 42.81 and a Q of 12.12. (See Table III.)

TABLE III

75th percentile	57.16
Median	42.81
25th percentile	32.92
Q	12.12

In this investigation, however, the age range is from 3 years 2 months to 46 years, the median chronological age being 8 years 1.2 months, and the Q 2 years 10.2 months. (See Table IV.)

TABLE IV

75th percentile	11 yrs. 4.8 mos.
Median	8 yrs. 1.2 mos.
25th percentile	5 yrs. 8.4 mos.
Q	2 yrs. 10.2 mos.

The IQ range on the Kuhlmann-Binet is from 10 to 93 with a median of 38.86, and a Q of 13.97. (See Table V.)

TABLE V

75th percentile	53.46
Median	38.86
25th percentile	25.53
Q	13.97

And on the Randall's Island Performance Series from 11 to 88, median 40.84, and Q 14.52. (See Table VI.)

TABLE VI

75th percentile	57.78
Median	40.94
25th percentile	28.75
Q	14.52

The following table may clarify the figures presented above:

TABLE VII

NO. OF CASES	RANGE OF C. A.	MEDIAN	Q	RANGE OF I. Q.	MEDIAN	Q
77	3 yrs. 5 mos.–14 yrs. 11 mos.	8 yrs. .6 mo.	2 yrs. 1.1 mo.	K. B. 18–77 R. I. Perf. 18–78	41.75 42.81	12.3 12.12
200	3 yrs. 2 mos.–46 yrs.	8 yrs. 1.2 mo.	2 yrs. 10.2 mos.	K. B. 10–93 R. I. Perf. 11–88	38.86 40.94	13.97 14.52

We find, therefore, that we have comparable median IQ's. The higher levels are naturally excluded since this investigation was undertaken in an institution for mental defectives.

The correlations found in both investigations are also practically identical, that of the original being + .89 with a P.E. of ± .02; the correlation of the present investigation being + .90 with a P.E. of ± .009.

These results indicate, therefore, that the prognosis from the original 77 cases does hold true. We feel justified, in the light of these findings, in grading those children who are not fitted for verbal tests on the Randall's Island Performance Series, and also in using this series for comparing the verbal and motor aspects of intelligence. These results also lend more strength to the theory that the motor and verbal aspects of intelligence are less differentiated in the lower levels than in the higher. As evidence for this we may take the correlations between the Stanford-Binet and Pintner-Paterson Performance scale. On Randall's Island cases this correlation is + .56 with a P.E. of ± .06. As the mental age increases, therefore, we find a clearer differentiation in these aspects of intelligence accounting for a functional specialization in the intellectual make-up of individuals.

A further investigation in the higher IQ ranges not covered by this study is in progress in the Research and Guidance Department in the Los Angeles city schools.

NEWS AND NOTES

The American Psychological Association will hold its annual meeting at the University of Michigan, Ann Arbor, Michigan, from September 4–7, 1935. The JOURNAL OF APPLIED PSYCHOLOGY would assure all psychologists in both pure and applied fields that they will find a great deal to challenge their interest and attention.

The Carnegie Foundation for the Advancement of Teaching has recently published a review of legal education in the United States and Canada for the year 1934. Topics discussed are the salaried professor in the learned professions, academic freedom under boards and presidents and the responsibility of administrative authorities. A survey of recent developments in medicine, law, engineering, and architecture reveals "great differences as regards the extent to which the education of their future members has been taken out of the hands of present practitioners and institutionalized."

The Review records outstanding developments in the law schools. Comparative tables show the present requirements for admission to the bars of each of the sixty states and Canadian provinces and changes in the number of law schools of different types since 1890. An appendix shows the number of lawyers in the several states and Canada at successive census dates, quotes the current standards of the American Bar Association and of the Association of American Law Schools and lists the publications of the Carnegie Foundation dealing with legal education and cognate matters.

Copies of these publications, including this recent Review for the Year 1934 may be had without charge by communicating with the office of the Foundation, 522 Fifth Avenue, New York City.

A preliminary fund of $15,000 has been established by the Scottish Rite Masons of the northern jurisdiction of the United States for the purpose of studying and investigating the causes of dementia praecox. A preliminary survey of the field is being made by Dr. Nolan D. C. Lewis, who is on leave from St. Elizabeth's Hospital, Washington, D. C. Dr. Lewis has been for many years director of the laboratories at this government institution for the care of the mentally ill. The project is in charge of a special committee composed of some of the foremost American leaders in the field of mental disease. The National Committee for Mental Hygiene is to administer the funds, $15,000 of which is already provided. Plans call first for locating the scientists, hospitals and laboratories already engaged in research in this field with a view of supporting promising research that is already under way and of finding fresh leads for

study and likely persons to engage in new projects. It has been estimated that over 150,000 unfortunate men, women and children are suffering from this dread mental disease.

Dr. H. Meltzer, of the Psychological Center, recently conducted tests on fifty stuttering children and fifty normal children from the speech centers of a large city school system. It was found that the stutterer is not driven to silence by his speech defect. On the contrary stuttering children are more talkative than children of normal speech. For example, one 10 year old girl used approximately 60 words to describe what she saw in an ink-blot while a 14 year old boy who had no speech difficulty tersely replied: "A cloud."

At the close of the conference on student recruiting in October, 1934, the Ohio College Association commissioned its Committee on College Entrance to collect from the colleges of Ohio data as to the experience, policies and practices of those colleges in the recruiting, guidance and admission of students. The committee undertook an extensive questionnaire investigation and secured at least partial returns from forty-five Ohio colleges. One of the first findings of the committee is that less than one-fourth of the graduates of Ohio high schools matriculate in any Ohio college. The total number of freshmen in the Ohio colleges in 1934–35 equalled less than 20 per cent of the June, 1934, graduates from the public high schools of Ohio. This is all the more significant since approximately four out of five college-going students of the state attend Ohio colleges. Each year forty to fifty thousand additional young people are added to the ranks of those who are high school graduates but do not matriculate in any college, despite the fact that the colleges of Ohio have spent a considerable amount in student recruiting activity. Some critics have advanced such reasons as the following why colleges are not enrolling more students—that colleges are slow to recognize new needs and to adjust their problems accordingly; that they modify their curriculum if at all only when forced to do so by popular demand; they are not trail blazers.

BOOK REVIEWS

KLINEBERG, OTTO. *Race Differences.* Harper & Brothers, New York. 1935. Pp. 367. $2.50.

The author in the introductory chapter has succeeded very well in presenting the various racial theories, subjective in most part, as set forth by the earliest writers down to the present time. He has brought together in one volume in a most interesting, authoritative and thoroughly scientific manner material dealing with race differences from the biological, psychological and cultural approach.

Under the biological approach to the problem such physical differences as color, height, head form, blood groups, brain size and structure, and developmental differences are discussed. A number of studies of basal metabolism, vital capacity and nerve conduction are considered in order to determine if these throw any light on the question of race. The author concludes, however, that "the available material suggests, though it does not prove, that group differences in physiological activity can be adequately explained without recourse to the racial hypothesis."

The psychological approach deals with possible racial differences first in the simpler psychological functions of sense perception and reaction time because these are believed to be closer to the physiological level than those of greater complexity. In the same section follow chapters on intelligence testing; the measurement of non-intellectual traits such as musical ability, personality and temperament; race mixture, crime and mental abnormalities. A comparison of the results of the intelligence tests given to various groups—whites, negroes, American Indians, Mexicans, Chinese, etc.—would seem to indicate that here at last was found real evidence of racial differences. However, according to the author, since more work has been done on the tests themselves, Terman's statement that the Binet scale was a true test of native intelligence, relatively free of the influences of nurture and background, was an exaggeration, and that environmental factors cannot be ignored.

In the section on cultural approach such topics are discussed as the fundamental drives, emotional expression, the abnormal, childhood and adolescence, personality and primitive mentality. The author cannot show, after very careful analysis of many arguments, that race can be regarded as the cause of a particular culture or as the cause of culture in general. Group differences are very important, but they seem to have no relation to race.

Among his final conclusions the author states: "In one sense, the end of this investigation finds us not much farther advanced than at its beginning. The subjective judgments of race differences, reviewed in the in-

troductory chapter, were dismissed as having little significance for a scientific, impartial study. The search for something more objective led through a considerable quantity of material, collected by all the methods at the disposal of both the natural and the social scientist, and presumably not too directly influenced by the personal whims and prejudices of the investigators. The findings, however, though rich and varied, are either inconsistent or inconclusive, and the general conclusion can be only that the case for psychological race differences has never been proved. This is perhaps a negative result, but it has certain very definite and positive implications.''

The book is written in an unusually interesting style and contains a wealth of bibliographical references—over six hundred in all—which should prove of much value to those who are interested in the problem of race.

JULIA L. CABLE,
Ohio University.

CORNELL, ETHEL L., and COXE, WARREN W. *Cornell-Coxe Performance Ability Scale.* World Book Co., Yonkers-on-Hudson, New York, 1934. 88 pages.

Various types of performance tests have been used since the beginning of clinical psychology for two separate and rather distinct purposes. First, as a standardized play situation during which the examiner can observe the child and make a subjective judgment regarding him. Second, as an objective and quantitative measure to sample the individual's behavior. In the latter situation the subjective factor is present only when the testee behaves in an unusual manner during the examination. The available performance tests have for some time been adequate to serve the first purpose which depends more upon the experience of the examiner than upon the accurate standardization of the tests. The literature has so far been noticeably lacking in descriptions of performance test batteries belonging strictly to the second class.

No test is of psychometric importance unless it has been shown to predict or estimate some particular type of behavior. A standardized play situation can hardly be considered a test at all except as it offers a quantitative, mathematically stated score. That the present authors do not agree with this conception of testing is at once apparent, for they begin by saying (p. 1), ''Perhaps one of the chief reasons why we have continued to use so-called performance tests, in spite of their frequent lack of adequate standardization, is simply that such tests offered additional opportunities for observation. The authors believe that this is the function of psychological tests as they are used in clinical examination.'' The reviewer heartily agrees that the observation of the child in the test situation *or in any other situation* may be of value, but the opportunities

offered for observation have nothing to do with the value of the test as a quantitative measure.

One reason why aptitude, college entrance, and other types of tests have advanced so far beyond performance tests is that clinical psychologists who have been using the latter have often failed to take into consideration recent advances in statistical methodology. In spite of the fact that Cornell and Coxe have prepared some twenty-six tables this is unfortunately the case with the present study. The authors state (p. 11) that one fault with present scales is "failure to standardize the scale upon a large unselected group," but they readily admit (p. 30) that their own distributions "are to some extent selected at the extremes and somewhat skewed." They have weighted their individual tests by one particular method because of this, apparently without realizing that no method of statistical treatment will overcome faults which are inherent in the raw data themselves.

In finding the mental age for each test score (sum of weighted scores on the individual tests) they are aware that many test standardizers have erred in taking the regression of test score on chronological age instead of the reverse, but they have failed to correct this rather fundamental error. Instead (Fig. 1, p. 35), they have drawn an empirical line midway between the two regression lines which they drew in as curves. These were drawn as curves in spite of the fact that the authors admit that the lack of linearity is due to the nature of the sample and not to the functional relationship between the two variables. On page 32 they use the Pearson r to express the degree of correlation between these same two variables but on page 34 they say, "the regression is not rectilinear, and we have therefore not used regression coefficients to determine the regression lines, but the lines of best fit for the plotted data." The reviewer replotted their graph and found the regressions to be linear. How many investigators use the Pearson r first and wonder about linearity afterward, if at all?

Although performance tests were originated for the purpose of testing the deaf, the foreign, and others for whom verbal methods are inadequate, the present scale requires the examiner to present oral directions consisting of an average of one hundred words for each of the seven tests. We find this to be in spite of the statement (p. 11) that one criterion employed in the selection of the tests was that "each test should be capable of presentation by non-verbal methods." The term "non-verbal" has little meaning when used to describe a scale which is administered by giving directions in not less than six hundred words (the seventh test is an alternate).

That clinicians lack a performance scale which can be used both as a substitute for and as a supplement to the Binet is well known. Several attempts to present such a scale have failed because adequate statistical

methods were not used and because the testing materials were not readily available at a moderate price. In his recent *Study of Some Factors in Form Board Accomplishments of Preschool Children*, Skeels has done an admirable piece of work in presenting photographs, drawings, dimensions, descriptions of materials, and directions for making his tests. Clinics usually have facilities for making and mimeographing their own materials when adequate directions are given, and in these days of restricted budgets this is especially desirable. The investigator who standardizes a performance scale on sound statistical principles and follows Skeels' example as well, will find that he is making a worthwhile contribution to clinical testing. The reviewer regrets that he cannot recommend the present study as an answer to this long felt need.

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NEW BOOKS AND PAMPHLETS

Books and pamphlets for review should be sent to JAMES P. PORTER, *Editor*, JOURNAL OF APPLIED PSYCHOLOGY, Ohio University, Athens, Ohio.

Education and the Exceptional Child. Proceedings of the Spring Conference, Child Research Clinics of The Woods Schools, Langhorne, Pa. April, 1935. 60 pp.

Factory, Family and Woman in The Soviet Union. SUSAN M. KINGSBURY AND MILDRED FAIRCHILD. G. P. Putnam's Sons, New York, 1935. $3.50. 334 pp.

Measurement of Musical Talent. HAZEL MARTHA STANTON. University of Iowa Studies, January 15, 1935. University of Iowa, Iowa City, Iowa. 140 pp.

Observational Studies of Social Behavior. DOROTHY SWAINE THOMAS, ALICE M. LOOMIS, AND RUTH E. ARRINGTON. Institute of Human Relations, Yale University, 1933. 271 pp.

Race Differences. OTTO KLINEBERG. Harper & Brothers, New York, 1935. $2.50. 367 pp.

Some Parent-Child Relationships. MARIAN J. FITZ-SIMONS. Bureau of Publications, Teachers College, Columbia University, New York, 1935. $1.75. 162 pp.

Directory of American Psychological Periodicals

(*Continued*)

Comparative Psychology Monographs — Baltimore: Johns Hopkins University Press. Subscription $5. 400 pages per volume. Knight Dunlap, Managing Editor. Published without fixed dates, each number a single research. Founded 1922.

Genetic Psychology Monographs—Worcester, Mass.: Clark University Press. Subscription $7.00 per volume. One volume per year. Edited by Carl Murchison. Bi-monthly. Each number one complete research. Child behavior, animal behavior and comparative psychology. Founded 1925.

Psychological Abstracts—Eno Hall, Princeton, N. J. American Psychological Association. Subscription $6.00. 700 pages ann. Edited by W. S. Hunter and R. R. Willoughby. Monthly. Abstracts of psychological literature. Founded 1927.

Pedagogical Seminary and Journal of Genetic Psychology—Worcester, Mass.: Clark University Press. Subscription $14.00 per annum; $7.00 per volume. 1,000 pages annually (2 volumes). Edited by Carl Murchison and an international cooperating board. Quarterly. Child behavior, animal behavior, and comparative psychology. Founded 1891.

Journal of Social Psychology—Worcester, Mass.: Clark University Press. Subscription $7.00. 500-600 pages annually. Edited by John Dewey and Carl Murchison. Quarterly. Political, racial, and differential psychology. Founded 1929.

Personnel Journal—Baltimore: The Williams & Wilkins Co. Subscription $5.00. 500 pages, approximately. Edited by Walter V. Bingham. Bi-Monthly.

Mental Measurement Monographs — Baltimore: The Williams & Wilkins Company. Subscription $5. 400 pages annually. Edited by Knight Dunlap and Buford Johnson. Published without fixed dates, each number a single research. Founded 1925.

Studies in Psychology and Psychiatry—Baltimore: The Williams & Wilkins Company. Subscription $5.00. 400 pages annually. Edited by Edward A. Pace. Published without fixed dates, each number a single research. Founded 1926.

Journal of Educational Psychology—Baltimore, Md.: Warwick & York. Subscription $6.00. Edited by Jack W. Dunlap, Harold E. Jones, and Percival M. Symonds. Published monthly except June to August. Founded 1910.

Child Development—Baltimore, Md.: Williams & Wilkins Company. Subscription $5.00. 400 pages annually. Edited by Buford Johnson. Quarterly. Founded 1930.

Character and Personality—Durham, N. C.: Duke University Press. Subscription $2.00 per annum. Quarterly. Edited by Robert Sandek (London) and Ernest Seeman (Durham, N. C.). Founded 1932.

The Psychological Exchange—11 East 125th Street, New York, N. Y. Subscription $3.00 per annum. Bi-monthly. Edited by James Hargan. Founded 1932.

Directory of American Psychological Periodicals

American Journal of Psychology—Ithaca, N. Y.: Cornell University. Subscription $3.50. 624 pages annually. Edited by M. F. Washburn, K. M. Dallenbach, M. Bentley, E. G. Boring. Quarterly. General and experimental psychology. Founded 1887.

Journal of General Psychology—Worcester, Mass.: Clark University Press. Subscription $14.00 per annum; $7.00 per volume. 1,000 pages annually (2 volumes). Edited by Carl Murchison and an international cooperating board. Quarterly. Experimental, theoretical, clinical, and historical psychology. Founded 1927.

Psychological Review—Princeton, N. J.: Psychological Review Company. Subscription $5.50, $40 pages annually. Bi-monthly. General Psychology. Edited by Herbert S. Langfeld. Founded 1894.

Psychological Monograph—Princeton, N. J.: Psychological Review Company. Subscription $6.50 per vol. 500 pp. Ed. by Joseph Peterson. Published without fixed dates, each issue one or more researches. Founded 1895.

Psychological Index—Princeton, N. J.: Psychological Review Company. Subscription $4.00. 300–400 pp. Edited by W. S. Hunter and R. R. Willoughby. An annual bibliography of psychological literature. Founded 1895.

Psychological Bulletin—Princeton, N. J.: Psychological Review Company. Subscription $6.00. 720 pages annually. Psychological literature. Monthly (10 numbers). Edited by John A. McGeoch. Founded 1904.

Archives of Psychology—New York: Columbia University.
Subscription $6. 500 pp. ann. Ed. by R. S. Woodworth. Published without fixed dates, each number a single experimental study. Founded 1906.

Journal of Abnormal and Social Psychology—Eno Hall, Princeton, N. J. American Psychological Association. Subscription $5. Foreign, $5.25. Editor, Henry T. Moore. Quarterly. 448 pages annually. Abnormal and Social. Founded 1906.

Psychological Clinic—Philadelphia: Psychological Clinic Press.
Subscription $3.00. 288 pages. Ed. by Lightner Witmer. Without fixed dates (Quarterly). Orthogenics, psychology, hygiene. Founded 1907.

Psychoanalytic Review—Washington, D. C.: 3617 10th St., N. W.
Subscription $6. 500 pages annually. Psychoanalysis. Quarterly. Ed. by W. A. White and S. E. Jelliffe. Founded 1913.

Journal of Experimental Psychology—Princeton, N. J. Psychological Review Company. 900 pages annually. Experimental. Subscription $7.00. Bi-monthly. Edited by S. W. Fernberger. Founded 1916.

Journal of Applied Psychology—Lancaster, Pa.: Science Press Printing Co. Subscription $4.00. 600 pages annually. Bi-monthly. Edited by James P. Porter, Ohio University, Athens, Ohio. Founded 1917.

Journal of Comparative Psychology—Baltimore: The Williams & Wilkins Co. Subscription $5.00 per volume of 450 pages. Two volumes every year. Edited by Knight Dunlap and Robert M. Yerkes. Founded 1921.

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